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VOL. XXIX., PART 1. [JULY, 1912.

Registered at the General Post Office for Transmission by Post as a Newspaper.]

THE QUEENSLAND AGRICULTURAL JOURNAL,

ISSUED BY DIRECTION OF

THE HON. THE SECRETARY FOR AGRICULTURE.

EDITED BY A. J. BOYD F.R.G.S.Q.

VOL. XXIX. PART 1.

JULY.

By Authority
BRISBANE: ANTHONY JAMES CUMMING, GOVERNMENT PRINTER.
1912.

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NOTICE.

Queensland Agricultural Journal.

It is hereby notified that the *Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s., which will include postage. Schools of Arts will be supplied at the same rate.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXIX. JULY, 1912. PART 1.

Agriculture.

FORMS IN WHICH LIME MAY BE USED ON THE FARM.

Time was when the Queensland farmer had no troubles either with worn-out soils or with the manifold pests which now cause him so much trouble and expense; but, after land has been unceasingly worked for forty or fifty years, as is the case with many of our farms—both scrub, plain, and forest—it behoves the farmer to renovate the soil by means of more scientific farming, manuring, draining, irrigating, &c. Here and there we find heavy clay soils; elsewhere there are sour soils, and such soils are those to which the judicious application of lime is beneficial.

Realising the value of lime applications to soils, the Florida Experiment Station has issued the following bulletin, which conveys the information that of fifteen plants, arranged in the order they are benefited by the use of lime, sugar-cane is third on the list:—

Quicklime (CaO) is obtained by burning native limestone or shells. It combines with water with avidity, crumbles down to fine powder, and forms what is best known as slaked lime. During this process it increases about one-third in weight and about three times in volume.

Air-slaked lime differs from fresh slaked lime in that it contains a large amount of calcium carbonate. In deciding the condition in which to purchase lime, it is well to consider that 100 lb. of quicklime are equivalent to about 140 lb. of slaked lime, and 170 lb. of air-slaked lime.

Floats is finely ground phosphate rock, and may be used to advantage on lands rich in organic matter.

Besides furnishing lime, it also slowly furnishes phosphoric acid. If the soil is in need of lime, other forms are better for supplying the want.

Wood ashes contain from 30 to 50 per cent. of lime, and may be used with good effect. Cypress ashes may be had for nothing in many places in the State. They contain about 50 per cent. of lime, and ½ per cent. of potash, and may be used to advantage.

Calcium sulphate or gypsum is found in deposits in many parts of the country. Much of the lime in acid phosphate is in this form.

Marl is earthy matter which contains partly decomposed shells. Its use is limited to farms in close proximity to the deposits, since the cost of its transportation is quite high. It is not uncommon for a marl to contain both potash and phosphoric acid in addition to lime.

How Lime Acts.—Lime enters into the composition of all plants, and is undoubtedly as much a plant food as potash, phosphoric acid, or nitrogen. A plant will not grow in the absence of lime, but this substance is so widely distributed in Nature that practically all lands contain sufficient lime to supply the needs of the plants that may be grown on it.

The benefit derived from an application of lime is due more to its chemical and physical action on the soil than merely an increase of lime available as plant food.

Without going into detail, the following are the chief chemical changes brought about through the agency of lime:—Lime as sulphate has the power to break up certain compounds containing potash in an unavailable condition. It also aids in the formation of double silicates of potassium and aluminium, in which form the potash, though available, is prevented from leaching out of the soil. It promotes a rapid decomposition of the organic matter in the soil, and causes its nitrogen to be converted into nitrates. This is the form in which nitrogen is best assimilated by plants. If there is an excess of soluble phosphoric acid in the soil, its tendency is to combine with compounds of iron and aluminium and become unavailable. The presence of lime prevents this, and is even believed to be able to decompose any iron or aluminium phosphates which are in the soil, so that the phosphoric acid may be utilised as plant food.

Thus it appears that lime, by its peculiar chemical properties, is capable of rendering available all three of the plant foods which may be in the soil in an inert form.

Another important function of lime is to correct the acidity of soils which are rich in organic matter. Such soils are frequently so sour that certain plants will not grow on them, yet they produce abundant crops after an application of lime. A moderate amount of lime also greatly facilitates the growth of nitrifying organisms which exist on

the roots of leguminous plants, and causes the nitrogen which these little helpers secure from the air to be converted into nitrates and in this form stored up in the soil.

PHYSICAL ACTION OF LIME.—Aside from its chemical action, lime when applied to stiff clay soils renders them more friable, easier to cultivate, and better able to supply moisture, heat, and air to the plants. Its use improves the texture of sandy soils, making them more compact and more capable of retaining moisture and fertilisers. It may be stated here, however, that sandy soils will not bear very heavy applications as will the heavy clay soils.

WHAT SOILS NEED LIME.—From foregoing statements it would seem that most soils would respond favourably to an application of lime. If a soil is decidedly acid or sour, lime may be applied with a great degree of assurance that benefit will follow. Its application to heavy clay soils will usually prove advantageous. The use of lime on poor sandy soils requires caution. When added to such soils it renders the little plant food in them available and tends to their rapid exhaustion. It is best in such cases to add liberal supplies of potash and phosphoric acid, and rotate the crops, using cow peas or velvet beans to supply the nitrogen and organic matter.

WHEN TO APPLY LIME.—In general it may be said that during the fall is the proper time for making application. If the land is sour, the application may be made just previous to planting. The same applies if only a small amount is to be used.

HOW TO APPLY.—In case quicklime is to be used, it may be placed in small piles at convenient intervals and a gallon of water poured on each pile. These should then be covered with earth to protect the lime from the air. The following day the lime should be spread as evenly as possible on the land and immediately incorporated in the soil with a harrow. If lumps of unslaked lime remain, the land should be harrowed a second time after a few days. It is important that the lime be thoroughly mixed with the soil, and it should never be applied and turned under. After screening the slaked lime, it may be applied to advantage with a grain drill or a lime spreader, if these implements are at hand.

HOW MUCH TO APPLY.—This depends largely on the character of the soil and the crops to be grown. It is considered better practice to use small quantities and to apply annually than to make heavy applications. Many, however, apply from 2 to 5 tons per acre at intervals of from five to ten years. Half a ton is a fair quantity for an acre of land possessing a moderate degree of fertility.

EFFECT OF LIME ON PLANTS.—All plants are not affected alike by lime. Most of them are benefited to a greater or less extent; some are indifferent; and a few are injured when grown on recently limed soil. The following is a list of the more common plants grown in Florida, arranged in the order in which they are benefited by the lime:—Lettuce, beets, sugar-cane, celery, onions, parsnips, cabbage, canteloupes, tobacco, egg plants, pepper, pea, fruits, corn, and cotton.

About the only plant grown in the State which is injured by the lime is the watermelon. This applies only when a moderate quantity is used, as peas and other legumes, corn, and cotton are injured by large quantities of lime. It may be said, in this connection, that it is better to avoid the use of lime on soils which are to be planted in potatoes, since its use would favour the development of the potato scab fungus.

DOES IT PAY TO LIME.—In most cases the answer is in the affirmative. A vast amount of experimentation has been conducted in order to answer this question—in fact, nearly every experiment station has done more or less work along this line; and it has been conclusively demonstrated that lime judiciously applied is an efficient means for producing large crops at a good margin of profit. It costs about the same to plant, cultivate, and harvest a given area without regard to the size of the crop; and if this can be doubled by the addition of a few barrels of lime to the acre, the relative profit becomes very much greater. Besides, the lime will manifest a good effect for a number of years. In closing, I wish to repeat that the habit of liming may become pernicious when practised merely for the purpose of wresting from the soil its locked-up plant food; but when practised with a careful system of rotation and fertilising, it yields a profitable return.

COTTON-GROWING.

Mr. John Willis sends along to the "Daily Record," Rockhampton, the following cutting from the Melbourne "Argus" of 23rd April, 1912:—

Notwithstanding the comparative failure of both the Federal and Queensland Governments to induce, by bonuses and other means, the Northern farmers to grow cotton, the British Cotton Growing Association is still prepared to discuss another scheme. Last week a letter was received in Melbourne by a gentleman interested in the cotton-growing, in which Mr. W. H. Himbury, manager of the British Cotton Growing Association (15 Cross street, Manchester), writes:—

> Although the council of this association has always considered that self-governing colonies should, if possible, find the necessary funds for growing cotton and other economic products, it is most anxious and willing to develop cotton-growing in any part of the British Empire where the conditions are favourable; and if the Queensland Government has any scheme whereby the co-operation of this association would be beneficial to the advancement of the industry, it will receive careful consideration.

It is understood that important plans for cotton production in the Northern Territory are being matured, and that, as soon as the Director of Agriculture has had time to develop the details, an announcement will be made.

COMPLETE FERTILISERS FOR FARM AND ORCHARD.

By J. C. BRÜNNICH, Chemist to the Department of Agriculture and Stock.

The great advantages gained by using **improved methods of cultivation** in combination with the **application of artificial fertilisers,** in order to increase the productiveness of the soil, are getting gradually more recognised. It is quite self-evident that the best profits will result, if small areas are made to produce heavy crops of high quality. This is achieved by "**intensive cultivation,**" as practised in other countries; but our farmers, on account of land being comparatively cheap, hardly know what such cultivation means.

Even the richest of soil will gradually become impoverished by continued cropping; the crops not only become lighter and of poorer quality, but also much more liable to get diseases. The **plant foods** which are removed by the growing crops **must again be returned** to the soil in one form or another. With judicious application of artificial vertilisers, combined with thorough cultivation and, if possible, with rotation of crops, the fertility of the soil cannot only be maintained, but frequently considerably increased.

No artificial fertiliser will be of any value if it does not supply in **adequate proportion all the necessary plant foods** required by the crops and wanting in the soil. Excess of one plant food cannot make up for the absence or deficiency of another. In this respect grave mistakes have been frequently made, and no end of money was squandered by applying manures which only supply a part of the necessary plant foods and, perhaps, one which was not wanted at all. How often have large amounts of bonemeal been applied without getting any benefits, because Potash or Nitrogen were wanting more than phosphoric acid.

No amount of artificial fertiliser will be of **any value** if the land is not in **good tilth** by thorough cultivation, **well drained**, and the soil contains a sufficient amount of **humus** and **moisture.**

Again, it would be a great mistake to apply a large quantity of fertilisers one year and completely neglect to do so the following year.

Situation, climatic conditions, class of soil, and many other factors will influence plant growth, and will make certain districts more suitable for a special class of crops than others.

The importance of **humus** in the soil is frequently quite overlooked by many farmers and fruitgrowers. Unfortunately, a large number of our soils are deficient in the amount of humus they contain, and the customary methods of cultivation and climatic conditions have a tendency to continually lower the amount, and the soils, therefore, lose that **light friable state** necessary for the successful growth of all crops and for the conservation of moisture.

The amount of humus may be increased by the addition of bulky amounts of vegetable matters, dead leaves, straw, cornstalks, and more

particularly of **stable manure.** But even small amounts of stable manure used in addition to artificial fertilisers have a very beneficial action, and increases the value of the artificial fertiliser, evidently by increasing the bacterial activity in the soil.

Stable manure is, however, generally very scarce, and the most economic way to supply to the soil the necessary humus is by the practice of growing and ploughing in of **green manure crops.** As a rule, vigorous growing leguminous crops—like cowpeas, field peas, Mauritius beans, narico beans, velvet beans, &c.—are to be preferred ; but excellent results are frequently obtained with rape and mustard. The crop has to be chosen according to locality and season.

In orchards **mulching** of the fruit trees with green crops, stable manure, dead leaves, &c., is of particular value.

By growing crops in a **proper rotation,** applying the manures required for each crop, the fertility of soil will be increased and good results obtained.

In the case of many crops which, on account of local conditions, do not allow a rotation of crops—like, for instance, sugar-cane—it is always most profitable to give the land, after a few years of cropping, a complete rest. Instead of leaving the land bare or fallow, it is best to grow plants like pigeon peas, wild indigo, and lantana, which cover and protect the soil, and at the same time enrich the soil in humus and make further amounts of mineral plant foods available, so that after a few years of rest it is again completely renovated and fit to grow heavy crops.

In many of our soils the want of **lime** is very apparent, and is frequently shown by strong **acid reaction of soil** and subsoil. Many plants are very susceptible to soil acidity ; and application of artificial fertilisers, and more particularly such with an acid reaction, is frequently an absolute waste of money, unless the acidity is corrected by a previous application of lime in one form or another. Only in the case of heavy clayey soils the use of **quick lime** or **air-slaked lime** is to be recommended ; for lighter soils **carbonate of lime,** in the form of limestone screenings, and also **sulphate of lime** or gypsum, are to be preferred, and all have to be applied as a topdressing. Particularly after ploughing in heavy crops of green manure, many soils develop a high acidity, and may require liming.

As a rule, soils under cultivation for some years will require **complete fertilisers** in order to obtain good crops and maintain the fertility of the soil. It is of interest to mention that in Hawaii the extremely rich virgin soils, when put under sugar-cane, are manured with heavy dressings of artificial fertilisers from the very start, and consequently a heavy yield is obtained and maintained for years.

Still, the fact must be not overlooked that in many cases complete fertilisers are not always necessary and their use not economic. As an instance the manuring of wheat may be mentioned, which is quite different in Australia than in other countries. Practical experiences, gained in South Australia and Victoria, have shown that even very light dressings of superphosphate give excellent results, frequently even better than an application of complete fertilisers. Unfortunately, this experience is not universal; and already in New South Wales exceptions have been found, and it is quite

likely that our wheat-growers will find more complete fertilisers in certain localities better than superphosphate used by itself. All this is a matter of experience, which cannot be gained in a year or two; and experiments in this direction should be encouraged. No farmer should hesitate to do a little **experimenting** of his own, as it is quite probable that his soil requires a slightly different treatment than his neighbour's land.

The plant foods which are generally supplied by artificial fertilisers are:—

Nitrogen, Potash, and **Phosphoric Acid;** and, as they may be used in various forms, a few remarks on these points are necessary. It must be also borne in mind that the plants can only absorb, by the aid of the roots, such **mineral plant foods** which are actually in solution; and, therefore, **sufficient moisture** must be present in the soil, and the plant foods in the manure should be in a fairly **soluble form.** It is always best to use artificial fertilisers in the most concentrated form, in order to save freight and handling; and therefore, only such will be used in the manure formulæ recommended for the different crops. The **composition** of all **artificial fertilisers** on the market are published from time to time in the "Queensland Agricultural Journal."

Nitrogen is one of the most important and, at the same time, most expensive ingredient of artificial fertilisers.

Nitrogen promotes and stimulates the growth of leaves and stem, but rather retards, on account of a more luxuriant growth, the development of buds and flowers. The leaves generally show a deep-green colour, and the whole plant becomes more vigorous after application of a nitrogenous manure. In the form of **nitrates** it is most active and most readily available to plant life, and is generally applied in the form of **nitrate of soda,** or **Chili saltpetre,** which contains from 15½ to 16 per cent. of nitrogen. Saltpetre is, however, very soluble and, unless directly used up by the plant, may be readily leached out and lost in the drainage water. At the present day it is being replaced by the artificial product **nitrate of lime**, which is just as active and available, but not so easily leached out, and has a much better action on the soil on account of the large amount of lime it contains. Both fertilisers absorb moisture from the air, are not suitable to mix with other fertilisers, and are also bad to handle. They are generally applied as top-dressings in repeated small amounts at the time when the crop is ready to utilise them.

Nitrolim, or **cyanamide,** is another artificial product, containing about 18 to 19 per cent. of nitrogen and over 60 per cent. of lime. The nitrogen is not quite so readily available as in nitrate of lime, but it comes very close in its action and has other advantages. It may be readily mixed with other fertilisers, and may be applied some time before planting. When using this fertiliser by itself, it is best to mix it with about twice its weight of fine soil, to apply the mixture in drills or broadcast it, and cover well with soil, by subsequent harrowing or cultivating, a week or two before sowing or planting the crop. When mixing nitrolim, in the preparation of complete fertilisers, with superphosphate, it is advisable to sprinkle from time to time with a little water during the mixing, in order to keep down the heat produced by a chemical interaction, and to add the potassium sulphate last.

In most of the manuring formulæ, this nitrogenous manure is used, but it may be replaced if desired by the same amount of ammonium-sulphate, or increased amounts of dried blood.

Dried blood contains from 12 to 13 per cent. of nitrogen in a fairly available form, and many crops seem to benefit particularly by this nitrogenous manure, which, however, is rather scarce and not easily obtainable. Blood may be mixed with other fertilisers, and can be applied some time before planting.

Sulphate of ammonia contains about 20½ per cent. of nitrogen in a very soluble form, which, although being so soluble, is not easily leached from the soil, and becomes gradually changed into the active form of nitrate by the action of bacteria. It can be mixed with other artificial fertilisers, except those which contain free lime.

Other sources of nitrogen are fish manure, cotton-seed meal, oil cakes, meatworks manure, &c.

An **excessive application** of nitrogenous manure may act sometimes in a detrimental manner by producing a too luxuriant growth of foliage and tops. and reducing the yield of grain, fruit, or tubers. Such bad effects are counteracted by the addition of fertilisers containing potash and phosphoric acid.

Potash is an important constituent of all plants, and is found most abundantly in the young leaves and twigs, as it is intimately connected with the production of starch and sugar in the leaves and the subsequent transference of these bodies to fruit, tubers, &c.

Many of our soils are rather deficient in potash, and the mineral plant food is, therefore, of particular importance to farmers.

Sulphate of potash, or potassium sulphate, is the most concentrated form in which potassium is used as a fertiliser, as the salt contains about 50 per cent. of potash, in a very soluble and readily available form. This salt is easily handled, and can be mixed with all fertilisers, and can be applied at any time.

In the case of a few crops other commercial forms of potash manure—viz., **muriate of potash,** which contains from 50 to 60 per cent. of potash, and **kainit,** which contains an average of 12½ per cent. of potash—can be used with advantage instead of sulphate of potash.

Wood ashes—particularly the ash of lantana, tobacco leaves and stalks, coffee berry pulp—contain a fairly large amount of potash.

Phosphoric acid is the third important constituent of artificial fertilisers, and found therein in the form of its salts, called **phosphates.** Phosphoric acid appears necessary to the general nutrition of all plants, and hastens their maturity. No plant could produce seeds without a sufficient supply of phosphoric acid. It also aids in the assimilation of other compounds, and aids in the production and transport of the nitrogenous compounds in plant cells.

Practically, the majority of our soils are deficient in phosphoric acid, and more particularly the red volcanic soils are deficient in the readily available soluble form of phosphates, although the total amount present may be fairly high.

Phosphoric acid in the form of **Phosphate of Lime** is the principal constituent of the bones and teeth of animals; and bones, in one form or

another, therefore, form the chief supply of phosphoric acid in artificial fertilisers.

Superphosphates, obtained by treating either bones phosphates or mineral phosphates with strong sulphuric acid, contain from 17 to 19 per cent. of water soluble phosphoric acid, and in a special form of concentrated superphosphate up to 40 per cent.

When applied to the soil, the water soluble form of phosphoric acid will gradually change into a less soluble form, and this change is fairly rapid in our red soils rich in iron.

For soils inclined to be acid, superphosphates are not so suitable, and the phosphoric acid is generally supplied in form of **basic slag,** or **Thomas' phosphate,** which contains the phosphoric acid in a form insoluble in water, but readily soluble in weak organic acids like citric acid.

Bonemeal, or **bonedust,** contains from 20 to 25 per cent. of phosphoric acid in form of lime phosphate insoluble in water or weak acids, which, therefore, becomes available very slowly. Bonemeal generally contains from 3 to 5 per cent. of nitrogen, which makes this manure more valuable.

When studying the **requirements** of **fertilisers** of any crop, the nature of the soil has to be taken carefully into account. There may be a sufficiency of total plant foods, as disclosed by the ordinary agricultural chemical analysis of the soil, but they may be in a **very unavailable** form. Again, small quantities of plant foods, which may be quite sufficient for the crop in a light friable sandy soil which promotes a prolific root growth, may be quite insufficient in a heavy clayey soil.

In preparing the following list of **complete fertilisers** for the most important crops, an **average quality of soil** is assumed ; and it is quite possible that a slight variation in the formula, like reducing one or the other of the ingredients or increasing one or the other, may give better results.

On account of the reasons already mentioned, an excess of nitrogen in artificial fertilisers must be avoided—an excess of phosphoric acid or potash is not likely to do any harm.

In several cases different formulæ are given for one crop, and only a practical test can decide which one of the fertilising mixtures is to be prepared ; it may be also advisable and beneficial to apply sometimes the alternative fertiliser for a change.

As a general rule, it is much better to divide the total amount of fertiliser necessary or recommended for the crop into **two** or **more dressings** during the growth of the crop. For all **citrus fruit trees,** and generally **tropical fruits,** a dressing with artificial fertiliser during the winter months—say July to September—and towards the end of summer—about February—will be found most beneficial.

For **deciduous fruit trees** an application of a quick-acting artificial fertiliser before they begin to bloom is sufficient ; but all slow-acting manures like stable manure, &c., should be applied in autumn or early winter.

When a very quick-acting fertiliser is applied, it is generally better to supply at the same time some slow-acting one, so as to keep the tree well fed throughout the growing season.

Most **farm crops,** and particularly **vegetables,** which are, as a rule, gross feeders, will benefit by two or more dressings of artificial fertilisers.

Instead of using the mixture of concentrated artificial fertilisers given for each crop, the farmer or fruit-grower can purchase **ready-mixed fertilisers,** which are prepared by several firms dealing in artificial fertilisers.

For the application of artificial fertilisers calm and cool days should be selected, and the application made, if possible, just before or after rain.

Heavy applications of chemical manures should never come into direct contact with the roots of plants, but should be well mixed with the soil.

In order to make the information about manuring more complete, a few remarks on the **class of soil,** most **suitable** to some of the crops, are added :—

ALMONDS.

The free sandy loam of our coastal tablelands is particularly suited, if situations protected from late frosts and strong winds are selected.

Apply to the tree, of medium size, before coming into bloom, a mixture of—

2 lb. superphosphate
1 lb. sulphate of potash } per tree.
1 lb. nitrolim

APPLES.

Apple trees prefer a fairly rich sandy loam, and also do well on the coarse sandy granitic soil of our coastal tablelands, in the Southern portions in which the winter temperature is low enough to give the trees a complete rest during the winter months. Our orchard soils are generally fairly rich in potash, but rather deficient in phosphoric acid, nitrogen, and humus ; and mulching of the trees is of the utmost importance.

A good fertiliser for apple trees, grown on our sandy soils of average quality, would be—

1½ lb. bonemeal
1½ lb. superphosphate
1 lb. sulphate of potash } per tree.
1 lb. nitrolim

This quantity is for young trees ; for large trees over eight years old the quantity can be about doubled.

Another formula is—

4 lb. meatworks manure
1 lb. sulphate of potash } per tree.
½ lb. sulphate of ammonia

Several dealers in artificial fertilisers are preparing complete mixtures, suitable for fruit trees, containing from 10 to 14 oz. water soluble phosphoric acid, 3 to 4 oz. of nitrogen, and from 5 to 7 per cent. of potash, which can be applied in quantities from 5 to 10 lb. per tree, according to its size.

APRICOTS.

This fruit tree requires a fairly rich, well-drained, sandy loam, and does very well on our coastal downs country.

A tree in full bearing requires an annual application of—

3 lb. superphosphate
1½ lb. sulphate of potash } per tree.
1 lb. nitrolim

Young trees can be started with one quarter of this amount, gradually increasing the quantity from year to year until the above amount is reached. For very old big trees, grown on poorer soil, the quantity may be safely increased to 7 or 8 lb. per tree.

ASPARAGUS.

This plant requires a friable, well-trenched loam, rich in humus.

Heavy dressings of well-rotted stable manure, half-decayed leaves and straw, bones, &c., should be well incorporated with the soil.

The value of the stable manure is greatly increased by the addition of—

2½ cwt. bonemeal
2½ cwt. superphosphate
1 cwt. sulphate of potash } per acre.
2 cwt. nitrolim

or the same quantities in pounds—viz.,

2½ lb. each bonemeal and superphosphate ;
1 lb. sulphate of potash ; and
2 lb. nitrolim

for every 43 square yards of ground.

A good sprinkling with common salt when preparing the bed gives often good results.

When the shoots begin to appear, a dressing with 1 cwt. of nitrate of lime per acre, or 1 lb. per 43 square yards, can be applied to great advantage.

Asparagus is one of the few plants which likes chlorine (a constituent of common salt and of muriatic acid) ; and, therefore, in the above formula 1 cwt. of muriate of potash may be used instead of the sulphate.

BANANA.

Bananas require a deep well-drained scrub soil or rich alluvial loam, in sheltered position, free from frost, near the coast. The soil must contain a large amount of humus. The humus content of the soil must be kept up by mulching with green-manure crop, leaf mould, stable manure, &c.; and any acidity in the soil must be overcome by liming with lime, in form of carbonate of lime, as limestone, shell sand, limestone screenings, &c.

Even on exhausted soil, as long as the soil is in good physical condition and contains humus, bananas may be successfully grown by the aid of artificial fertilisers, applying from 5 lb. to 7 lb. of complete mixed fertiliser to each stool twice a year.

The following manure mixtures will be found beneficial, and will pay the grower by better returns of large bunches :—

Superphosphate, 3 to 4 cwt.
Sulphate of potash, 2 to 3 cwt. } per acre ;
Nitrate of lime, 2 to 3 cwt.

higher or lower amount according to age and quality of soil ;

or,

Superphosphate, 1½ cwt.
Bonemeal, 1½ cwt.
Sulphate of potash, 2 cwt. } per acre ;
Nitrolim, 2 cwt.

or,

Superphosphate, 3 cwt.
Sulphate of potash, 2 cwt. } per acre.
Dried blood, 2 cwt.

The artificial manure to be applied in two dressings—one towards the end of summer, at the end of rainy season ; and the other at the end of winter. Some soils contain a very small amount of salt, and in that case bananas will benefit by a slight dressing of common salt.

BARLEY.

This cereal prefers an open and free sandy loam. Barley is a valuable food for stock ; but it is also grown for malting purposes, and in that case an excess of quick-acting nitrogenous manure, like stable manure, nitrate of soda, &c., must be carefully avoided.

A complete fertiliser for malting barley is the following :—

Superphosphate, 1½ to 2½ cwt.
Sulphate of potash, ¾ to 1 cwt. } per acre.
Dried blood, ¾ to 1 cwt.

For barley grown as cattle food apply—

Superphosphate, 2 to 3 cwt.
Sulphate of potash, 1 cwt. } per acre ;
Nitrolim, 1 cwt.

one-half to be applied when sowing, and half as top dressing.

BEANS.

Beans grow well on almost any soil, but prefer a well-drained clayey loam. Like all leguminous crops, beans require lime, and the soil should contain a fair amount of this plant food. Apply per acre, according to the quality of soil—

2 to 3 cwt. of superphosphate ;
¾ to 1½ cwt. of sulphate of potash ;
None to ½ cwt. of nitrolim (or dried blood).

When the beans are grown to be eaten green, the amount of nitrogenous manure can be considerably increased by using 1 cwt. of nitrate of lime, applied in three or four portions as topdressing.

For use in garden, apply—

6 lb. superphosphate,
2 lb. sulphate of potash,
½ lb. nitrolim,

and 3 topdressings of ½-lb. of nitrate of lime to every 43 square yards.

[TO BE CONTINUED.]

A SHEEP FARMER'S SILO.

BY W. G. BROWN, Sheep and Wool Expert.

The Federal Statistician recently issued a list of the number of holdings in the Commonwealth where ensilage is produced. Among these Queensland is easily lowest with a total of ninety-seven silos.

It has been said a thousand times that Australia is fortunate in not having to provide (like our cousins the Canadians, for instance) artificial fodder for stock for five or six months in every year. Perhaps it is not so certain that we are fortunate. A few set-backs may teach us wisdom. For a decade, with one or two comparatively lean years, there have been most bounteous seasons; yet now that the inevitable drought is upon us, we are worse off than ever before, in possessing no reserve stocks of fodder, and tales of distress are being published daily, with the whole winter before us, and a strong probability of little or no rain before the spring. *Annual* dry spells might have forced us to conserve fodder.*

The best stock authorities of Australia are preaching ensilage—ensilage—ensilage—every time. Exhaustive experiments have been conducted in New South Wales for some years, and the results published. Amongst other interesting facts recorded, it has been shown that, for fattening purposes, ensilage is quite as good as green grass—that while hay alone causes serious losses in breeding ewes or cows when their time is come, ensilage is as good as natural pasture; that it is the cheapest fodder known, and the least liable to destruction or deterioration.

In regard to its use by sheep farmers especially, the Agricultural Department of New South Wales published the following *re* cost of feeding on ensilage made from natural growths:—

"While there is any dry feed about, a ration of 1 lb. per day will be quite sufficient for sheep; but, as the dry feed disappears, it will be advisable to gradually increase the ration to 3 lb. per day. At these rates 1 ton of silage will give a daily ration of 1 lb. to 2,000 sheep, allowing a fair margin for possible but not probable waste, while 3 tons will give a full daily ration; the cost for silage being 2s. and 6s. per day respectively at the pit, which is surely a small sum, and particularly so when it is remembered that, in drought time, if chaff or hay can be obtained at all, £8 per ton is considered very reasonable, and that dry feed is not nearly so suitable either for breeding ewes or milch cows as silage. In fact, once green feed has disappeared, there is nothing within reach of the sheep farmer which approaches silage as a cheap and satisfactory food for sheep. It may be as well to emphasise the fact that this silage is made from natural growths—viz., herbage, thistles, &c.—unaided by irrigation or any artificial means."

Thus the Agricultural Department of New South Wales. Coming to our own State, I witnessed the erection and filling of a silo, which proved to be perfectly effective, on Mr. E. Graham's holding, Manapouri, on Pilton Estate, Greenmount. This silo cost, material and

* The short season of drought terminated in June last.

labour included, £9 18s., and the 64 tons of ensilage put into it cost slightly over 4s. 6d. per ton. Mr. Graham is a feeder of sheep, hence the interest to other sheep farmers of his operations, which I proceed to give in detail.

Most silos cost at least £1 for every ton capacity, and require skilled labour and expensive materials. It is doubtful if the regulation silo can be built on the Downs, under present conditions, at less than 25s. per ton capacity.

The crop was maize, sown broadcast on 8 acres. Owing to the dry time, it was plain to the manager that it would come to nothing as far as grain was concerned. It was comparatively stunted; in some places not more than 3 ft. high, and the rest not higher than 6 ft. It was light in the stalk, and only sparsely furnished with immature cobs. A 6-h.p. steam engine was hired, and also a cutter and blower of American make. The cost of erecting the silo as furnished by Mr. F. Reams (Mr. Graham's manager) was as follows:—

MATERIALS AND LABOUR.	£	s.	d.
10 Poles, 19 ft. long, 8 in. at big end, at 10s. each ..	5	0	0
10 Fencing posts, 6 ft. 6 in. long, at 6d. each	0	5	0
230 Feet, wire netting	1	10	0
Fencing wire, bolts, and sundries	0	10	0
Labour of 3 men for 2 days, at 5s. per day, with board and lodging	2	8	0
	£9	13	0

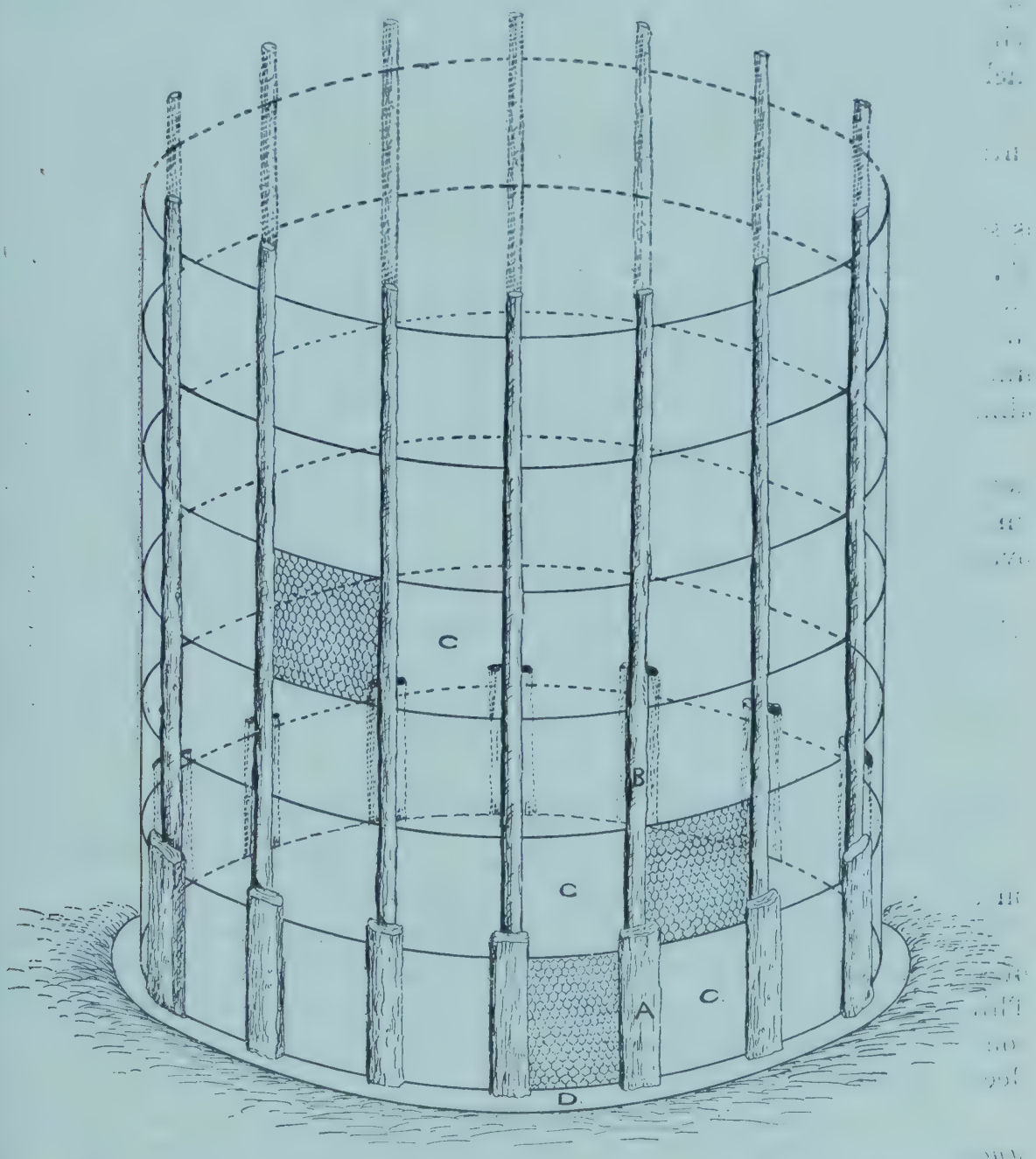
COST OF MAKING ENSILAGE.			
8 Men for 3 days, at 5s. per day	6	0	0
1 Engine driver, 3 days at 10s. per day	1	10	0
Wood for engine, 1 cord at 7s. 6d.	0	7	6
Food for 8 men, at 14s. per week, for 3 days	2	8	0
Hire of engine, 3 days, at 10s. per day	1	10	0
Hire of blower and cutter, at 10s. per day	1	10	0
Binder twine	0	2	0
Sundries not enumerated	1	0	0
	£14	7	6

When the last sheaf was cut and blown into the silo, it was estimated that not less than 64 tons of ensilage had been manufactured.

The cost, therefore, of making 64 tons of ensilage, works out at about 4s. 6d. per ton. Truly a cheap food for stock if 4 lb. be a full ration for a ewe and lamb.

METHOD OF BUILDING.

A circle was made 18 ft. in diameter, and at regular distances ten holes were sunk in the earth to a depth of 3 ft. In these holes the fencing posts were placed, and well tamped in. The 19-ft. poles were then placed beside the posts, about 6 in. in the ground, and on the inside, facing the centre of the circle. They were firmly fastened to the posts by ½-in. bolts, two to each pole. Then, at distances of about 3 ft. apart, holes were bored in the poles, and ordinary black fencing wire drawn through. Then the wire netting was attached to the poles on the inside, as high up as was deemed necessary for the estimated amount of available crop. The appearance of the silo when finished, shown in a crude way, was as below:—



An ordinary reaper and binder was used, and it was found that, instead of two wagons sufficing to keep the field clear, the machine, excepting when it broke down on one occasion, was always ahead of the wagons.

Similarly, the machine could not get enough material to work at full capacity. Two wagons extra would be required to keep up a full supply of maize. Only straw was placed on the earth, and the blower was placed at its greatest extension, and was not shifted at all afterwards. A drain was dug around the silo after it was filled.

For roofing purposes, about 1 ton of weeds and rubbish was chaffed up very small and blown on to the top of the silo stack (the centre of which was raised) to a depth of about 4 in. over all. On top of the chaff was placed about 1 ton of long firewood set with ends at the centre and circumference of the ensilage. Any person whatever can build a simple affair such as this, and, if he keep sheep, will be able to smile at a dry time. Ten acres of maize, grown in a good time and put into such a silo, means quite 150 tons of ensilage, and 150 tons of ensilage will keep at least 600 sheep for 150 days at a cost of less than £40, inclusive of cultivation.

Several keen practical farmers who came over to see this silo were enthusiastic as to its possibilities.

Of course, the method as compared with the more permanent silos is somewhat crude, yet these cheap silos may be improved upon without any serious addition to cost. For instance, after a few feet had been chaffed into the silo, Mr. Reams thought that it would be an advantage to put something on the wire netting to keep out air. He caused a number of stalks of maize to be interlaced, and the result was that an almost air-tight surface is presented wherever that method was applied.

For the coming lamb-raising business on the Downs, it will be necessary to keep the ewe and lamb without a check. With this cheap and handy method there can be no excuse for a man having to "hold over" his lambs through a bad time.

Messrs. Graham and Reams are to be congratulated upon their wisdom and enterprise in showing the way.

CLEARING LAND WITH DYNAMITE.

Mr. R. B. Howard, Chief Protector of Aboriginals, writes as follows on the subject of "Clearing Land with Dynamite":—

For some years I have been using dynamite on my farm for purposes of clearing the land of timber, for subsoiling, and also for draining. Thinking perhaps a description of the methods employed may interest some of your readers, I am now sending a few notes which you may deem desirable to publish:—

In clearing land of stumps or trees, a charge of dynamite is placed *under*, not *in*, the stump, by boring a hole with a 1¼-in. shell auger on three sides of the tree or stump to be operated upon. The holes are bored at an angle of, say, 45 degrees, with the object of bringing the bottom of the holes as closely together as possible, the depth of each hole being about 3 ft. The size of the stump will regulate the charge.

For a stump of 18 in. in diameter I would use four cartridges in each hole—that is, twelve altogether. When charging, I always split the paper wrapper of the cartridge on two sides, and place *one* cartridge at a time into the hole, carefully squeezing down with a wooden rammer. Only *one* cartridge is primed with detonator and fuse. This cartridge is, of course, *not cut*. When the holes have been charged and tamped, the fuse is fired, and the concussion in one hole has been found sufficient to explode the others. It will, of course, be understood that the bottom of the holes must not be more than, say, 8 or 10 in. apart.

This method of clearing land I have found a good deal more preferable and less costly than pulling stumps or trees with a machine, and I estimate you can blow up fifty stumps in the time it would take to remove one or two under other methods.

The effect of the dynamite is to split up the stump, remove all soil sticking to the roots, break all the main roots, and loosen the soil for yards around; and the stump burns readily. Moreover, *one* man can do all the work.

In the ordinary cultivation work I have found dynamite most useful in almost every class of soil, but more especially where a substratum of clay is in evidence. By drilling or boring with an auger holes 20 ft. apart to a depth of 3 ft., and charging each hole with three plugs of dynamite, it will be found, after explosion, that the subsoil is fractured, for a radius of not less than 10 ft. from each hole, to a depth of about 4 ft. It would be quite superfluous for me to point out to the agriculturist the value of such an effect on the soil.

Again, where an orchard shows signs of decay, which is often the case with citrus orchards, the effect of dynamite blasting gives marvellous results, the trees in a very short time regaining their vigour and showing luxurious growth.

In fact, from the experience I have gained in using dynamite, I am strongly of the opinion that, were its value as an adjunct to farming more generally known, it would come into general use. The cost compared with other methods has also to be considered; and when it is pointed out that 1 acre of land can be efficiently subsoiled—more so than by any other means—for a sum less than £5, the value of the operation is apparent.

In my own case I have just treated about 2 acres of land in which ornamental trees had been planted, but, although about three years old, the growth was stunted and altogether unsatisfactory, owing to a cold impervious white clay underlying the few inches of top soil; and I am satisfied these trees will now make a good growth. Again, I have also treated my orchard in a similar way, and the result has already been very satisfactory.

The general opinion appears to be that dynamite is exceedingly dangerous to handle. Well, Mr. Editor, so is a gun if placed in the hands of a careless person. My sons and myself handle dynamite constantly without the slightest fear of an accident; and, if the same care is exercised as would be in the case of a loaded firearm, there is

little or no danger—in fact, a pea rifle in the hands of a young lad is far more dangerous than a ton of dynamite under the care of a responsible person.

I shall be glad to afford any information in my power to anyone inquiring as to the use of this explosive in farming operations.

SWEET POTATOES.

By G. B. BROOKS, Instructor in Agriculture.

In my travels throughout the State, more especially in districts where settlers new to Queensland conditions are commencing operations, I have had numerous inquiries relative to the raising of the sweet potato. This short article is mainly intended to supply information to those newcomers who are entirely unfamiliar with this crop, and the methods to be observed in the growing of such.

Why this crop has not received more consideration from the hands of a Queensland farmer is somewhat of a mystery, for when we come to compare the two crops we find that the sweet potato has many apparent advantages over its English compeer. Grown, as it is, during the season of the year when moisture is most abundant, it is invariably a sure cropper, which cannot be said of the English variety, and gives at least five times the return per acre. It is less liable to disease, and has also a higher food value.

It provides excellent food material for all kinds of stock—pigs, cows, horses, fowls—and in the hands of a good cook can well be classed as a table delicacy.

The high price ruling and likely to continue for English potatoes, should also be the means of bringing this crop into a more prominent position as a product of the farm.

It is usual to preface an article on any plant or crop by a short history of its origin and introduction, &c. This I am to discard, and in its place insert the following paragraph, taken from an early issue of the "Queensland Agricultural Journal," and which I think will be of more interest to the farming community:—

"A RECORD CROP AT ST. HELENA.

"In the year 1888 a crop of sweet potatoes was harvested at St. Helena, which we believe has not yet been equalled there or elsewhere. The soil of the island is red volcanic, rich enough to require no manure. Twelve acres were planted with sweet potatoes, on 6 acres of which the yield was 35 tons of saleable potatoes per acre; 155 tons 9 cwt. were sold for cash at an average price of £4 15s. per ton, some fetching £6 10s. per ton. Over 38 tons were used for domestic purposes, and the balance was fed to stock. The largest potato weighed 34 lb. The variety grown was the Maltese, and they were planted on ridges 3 ft. apart. The season was very favourable as regards rainfall, and the high price obtained was attributable to the partial failure of the English potato

crop. The total value of the crop sold was £919 2s. 6d. If the produce of the 6 acres had been sold at the higher price—viz., £6 10s. per ton—the return for the 210 tons would have reached £1,365."

The yield mentioned in the above is by no means extraordinary. The writer has found, from experience gained in growing this crop, under the varying conditions obtaining in North, Central, and Southern Queensland, that, by giving attention to details in regard to cultivation and planting, very heavy yields can be secured even in situations considered by many growers entirely unsuitable for the sweet potato. What, then, are the conditions that govern the successful growing of this crop? The first point to be considered is—

CLIMATE.

The sweet potato undoubtedly favours a rather warm moist climate. Conditions suitable for the growth of maize are equally suitable for the sweet potato. It can also be grown in hot dry districts, providing the land has been worked, so as to conserve the maximum amount of moisture. Being very susceptible to frost, it is essentially a summer crop.

SOIL.

Sweet potatoes can be successfully grown in practically any soil suitable for ordinary cultivation. The impression held by many, that this crop can only be grown on a sandy loam, is erroneous—in fact, the heaviest crop raised by the writer was on a very stiff basaltic clay, which gave a little over 50 tons per acre. The reason why a sandy loam generally gives best results is that more liberties can be taken with this class of soil, in regard to cultivation, than with one of a heavy or more tenacious nature. This fact must not, however, be lost sight of—viz., that a rich friable loam will invariably give the best returns, a well-drained soil being essential to the production of a good quality tuber. I was recently shown what was locally thought to be something extraordinary—a heavy crop of sweet potatoes growing in a swampy grey clay soil, and where water could be obtained at a less depth than 2 ft. Although the tubers were large, the quality was not the best.

PREPARATION OF THE SOIL.

The land intended for this crop should be broken up at least two months previous to planting, the depth to vary with the quality of the soil. Less than 6 in. is not, however, recommended. A second ploughing should follow, and, in the event of the ground being rough or lumpy, the roller and disc cultivator should be made use of to bring about the necessary tilth.

The question is often put: "Is hilling necessary?" In the majority of cases it is. The exception is in very dry and hot localities and where the soil is loose and friable. In soils that are liable to set hard, hilling is essential to the securing of a heavy yield of well-shaped tubers—the size of the hill is dependent to a large extent upon condition of soil and rainfall.

In coastal districts enjoying a moderately regular rainfall, a 3-ft. hill or ridge is generally sufficient, upon which a single row of cuttings is planted.

In drier localities wider ridges are advocated—3 ft. 6 in. for single row, and 5 ft. for double row.

The 3-ft. ridge can be set up with an ordinary mouldboard plough or single disc, simply by throwing two furrows together. It is important that the furrows should not meet, but that a V-shaped depression should be left on top for the purpose of retaining any rain that falls for the benefit of the young plants. The ridge, to prevent drying out, should also have plenty of "body." The following illustration will demonstrate this point:—

The ridges should be set-up sufficiently early to allow of planting being carried out as soon as sufficient rain has fallen to ensure rooting.

PROPAGATION.

The securing of a heavy yield depends largely upon two factors—viz., the selection of sets from a healthy and prolific variety, and early planting. The common practice of waiting until cuttings are available from the residue of the previous year's crop cannot be too strongly condemned, more especially in cool districts or dry localities, where the growth of vines during early spring is invariably slow. Neglect in the selection and cultivation of the sweet potato very soon leads to degeneration, and, where slipshod methods have been practised, we hear frequent comments about the crop "running out," and that instead of developing tubers thick stringy roots are produced. Cuttings from these decadent vines will invariably produce similar plants. Now the raising or breeding up of a good class of sweet potato is a comparatively simple matter, as the following directions will show:—

A month previous to planting dig a shallow pit or bed, preferably in some sheltered situation—about 1 ft. 6in. deep and 3 ft. across, the length depending upon the number of vines required. Three parts fill this bed with unrotted stable manure, containing a fair proportion of straw to ensure heating. If dry, water slightly; then tread down level. Cover with about 3 in. of sand if available; otherwise sandy or any other soil will do. Allow two days to settle, so as to get rid of ammonia fumes, which would cause rotting. Select the medium-sized tubers from the most prolific vines; place on top of bed, close together, but not touching. Cover to a depth of 10 in. with soil similar to what they are placed on, and water occasionally. A bran bag or two nailed to a couple of saplings will be found very convenient to throw over the bed in the event of frosts being experienced.

It is surprising the very large number of cuttings that can be secured in a very short time from a few square yards. In removing the

shoots for planting, care should be taken to cut close to the ground. By keeping the bed moist, successive cuttings will be available at very short intervals.

By adopting the above method of selection and propagation, the farmer will find that the quality of this crop will be considerably improved, and that there will be no necessity to go to another district for a change.

In connection with plant breeding, it may be mentioned that the introduction of farm seeds, etc., into a district differing in soil and climatic conditions is now generally regarded as a mistake. It is only the careless farmer who benefits by such a change, for in going outside his own district he invariably buys seed of a higher grade and from one who has exercised discretion in regard to selection.

PLANTING OUT.

The time to put the cuttings out may be said to be just as soon as all danger of frost is over and sufficient moisture is present to ensure rooting. In the coastal districts it is generally safe to plant about the beginning of September, and correspondingly later on the western side of the Range according to locality. Planting in December is favoured by many, owing to conditions being favourable for a good "strike" to be followed by luxuriant growth. Unfortunately, luxuriant growth accompanied by heat and moisture has a detrimental effect on the setting of the tubers. From personal experience I have found that early planting, even if followed by a dry spell, is a distinct advantage in that the check during the early period of growth has the effect of inducing the plant to set tubers, and less tendency to run to vine later on.

Cuttings taken from the end of the vines are generally the best. They should be about 9 in. long, and covered to within an inch or so of their total length. Planting with a peg or dibble is not recommended. Scooping out a depression by hand and pressing the soil firmly on the cutting is much better. Sometimes cuttings 12 in. long are used, and both ends left uncovered. Small tubers can be used instead of cuttings, but the results from such are not generally satisfactory.

VARIETIES.

There are a number of varieties under cultivation in Queensland—the most common of which are White Maltese, Rosella, Yellow Spanish, and Spanish Giant. The White Maltese is a general table favourite, produces long tubers, and is a rather late maturing variety. The Spanish varieties, being heavy croppers, are very suitable for pigs and other stock.

AFTER CULTIVATION.

Given favourable climatic conditions, very little after cultivation will be necessary. Any strong growing weeds will require to be kept down with the hoe. The smaller weeds will eventually get choked out with the rapid growth of vines.

HARVESTING.

For table use and market purposes, the harvesting is generally done by hand labour, the tubers after removal of the vines being dug out with a digging fork.

When required in large quantities for pigs, &c., the plough can be used. A deep furrow is first thrown away from the side of the ridge, to be followed by another which turns out the potatoes. The sweet potato is seldom stored, being dug as required. There is little difficulty, however, in keeping the tubers. A cool airy building is necessary, the tubers being spread in layers and covered with dry sand.

PESTS.

This crop has, so far, proved practically free from disease. The borer is, however, prevalent in many of the older districts. This pest bores into the upper portion of the tuber when growing, and when once in the soil it is very hard to eradicate. In new and isolated districts the greatest care should be exercised in the introduction of tubers intended for seed purposes. Should there be any difficulty in the procuring of such, it would be distinctly advisable to propagate this crop by means of cuttings.

TREATMENT OF SEED POTATOES WITH FORMALIN.

A WARNING.

In the "Agricultural Gazette" of New South Wales (says that journal of 2nd May) it has, on several occasions, been recommended that seed potatoes be treated with formalin to prevent the development of scab and other diseases in the crop. This last season the potatoes at Bathurst Experiment Farm, which were treated in this way, were practically a failure, whilst plots of untreated seed germinated well. In the Farmers' Experiment Plots, also, the germination was defective, probably due to the same cause.

It seems clear that, under some conditions, at least, formalin has a bad effect upon the germination of potatoes. Experiments are now being conducted with solutions of different strengths, and other remedies are also being tested. Meanwhile, this warning is issued for the benefit of potato-growers, who are advised to be cautious in using formalin.

IRISH TOBACCO.

Tobacco-growing in Ireland seems (according to the eleventh annual report of the Department of Agriculture) to be going ahead. There are about 135 acres under tobacco, and the prices realised from manufacturers for the output average 5¼d. per lb. In his remarkable book, "The Case Against Home Rule" (128 pages, published by the West Strand Publishing Company at 3d.), Mr. L. S. Amery, M.P., draws attention to tobacco as one of the industries which might be profitably developed, especially under a system of tariff reform which gave Imperial preference. He says Ireland might secure £1,000,000 of the £3,500,000 spent on unmanufactured tobacco.

WATER SUPPLY TO FARMS.

By ARTHUR MORRY, Surveyor, Department of Agriculture and Stock.

THE COLLECTION AND STORAGE OF RAINFALL.

[CONTINUED.]

Sometimes conditions are such that a good storage reservoir is best obtained by constructing a substantial earthern dam across the gully, and providing a suitable by-wash to conduct the surplus water into the same gully at a point below the dam.

When labour is cheap, this form is generally inexpensive, as little material requires to be purchased. Care must, however, be taken to make it sufficiently streng to resist the pressure and perfectly water-tight, as the smallest leak caused even by a rat hole will gradually extend until the whole dam is destroyed.

The following specification will describe a dam of this character:—

Select the site in such a position that the construction of the dam and by-wash will not seriously divert the gully stream from its original course.

Excavate the surface soil from the whole of the ground to be occupied, and remove it to the outer toe of the bank. When nearing completion, spread this evenly over the outer face of the embankment, so as to form a slope of 2 to 1.

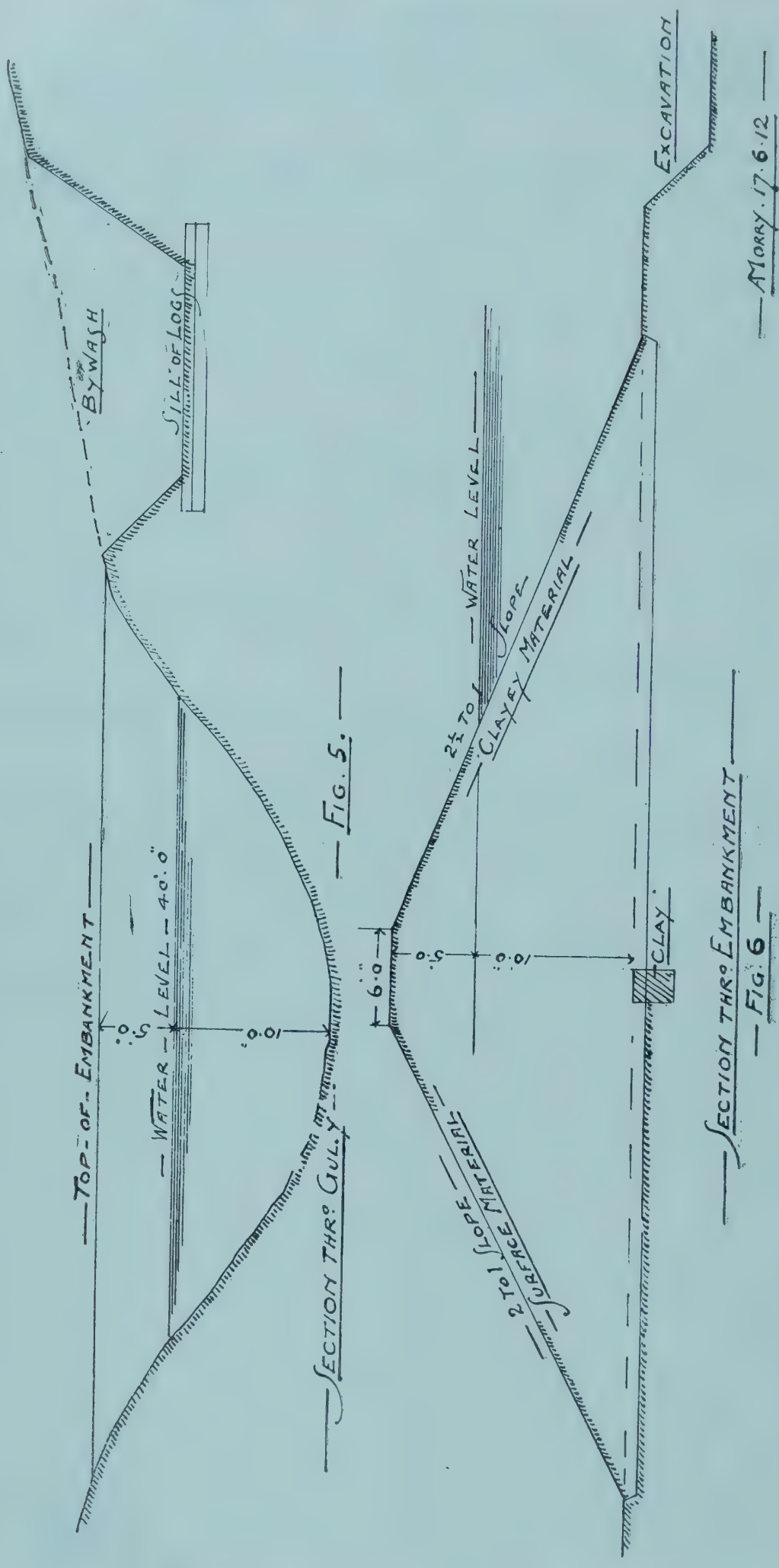
Excavate a trench 2 ft. deep and 2 ft. wide right across the gully and into the bank on each side, and fill this with well-puddled clay placed in 12-in. layers and well rammed.

Excavate the bed of the gully as shown on Fig. 6, in order to obtain material for forming the embankment; that taken from near the surface to be deposited on the outer portion; the other material, which is generally of a more clayey character, to be deposited on the inner portion, forming a slope of 2½ to 1. As far as possible, the embankment should be formed in layers 12 in. in thickness, each layer being consolidated by ramming or other means; the crest to be not less than 6 ft. in width, and to be carried up to a height of 5 ft. above the full-supply water level; to be well consolidated by passing traffic over it during construction.

Excavate for the by-wash as shown on Fig. 5, on the side most suitable for the purpose, and of sufficient width to ensure the passage of all surplus water when the dam is full. This width can only be determined by the extent of the catchment area and the quantity of water likely to pass over. Should it be too small, the water during storms will find its way over the top of the embankment and gradually wash it away.

The bed of the by-wash should be excavated to a grade of 1 in 200, with heavy logs across same, placed close together for the first 5 or 6 ft., thus forming a sill; and a sill piece of several logs placed on the top and by the side of each other across the by-wash, opposite the crest of the dam, the top log to be the same level as the full-water supply.

If clay is available, the whole of the inner face of the embankment should have a layer of 6 to 12 in., evenly spread and well rammed in position.


TOP OF EMBANKMENT
BY WASH
SILL OF LOGS
WATER LEVEL 40'0"
SECTION THRO' GULLY
FIG. 5.
WATER LEVEL
2½ TO 1 SLOPE
CLAYEY MATERIAL
EXCAVATION
MORRY. 17.6.12
6'0"
CLAY
2 TO 1 SLOPE
SURFACE MATERIAL
SECTION THRO' EMBANKMENT
FIG. 6.

When clay is not available, a core of galvanised corrugated iron may be effectively used by jointing the sheets horizontally and vertically with strips of bituminous material or rubber insertion, bolting together tightly, and protecting, as already described, with several coats of pure cement wash. The sheets should be extended some distance into the banks on each side, and the earth rammed tightly against same. In all probability long before these sheets will have corroded the ground will have become so thoroughly consolidated as to be perfectly watertight.

In a case of this kind, quantities can only be used for comparative purposes; but, as a guide to those interested, an approximation is here given based on an assumed width of 40 ft. and a height of 10 ft. at water level when full. By this the reader will be able to form a rough idea of the cost of any similar work he may contemplate, bearing in mind the fact that cost of labour varies in different districts.

The embankment will contain about 650 cubic yards of earth, all of which must be excavated, deposited, and well rammed in position. The cost of this will depend entirely on the nature of the ground, and will vary from 1s. to 2s. per cubic yard

Hill-side dams and underground tanks will be next dealt with.

[TO BE CONTINUED.]

MANURING OF POTATOES.

It is contended by the British Department of Agriculture that a proper system of manuring is an important factor in keeping down blight, and to this end report the results of recent experiments. The best results were obtained from a combination of farmyard manure and artificials. A light dressing of farmyard manure, with a suitable dressing of artificial manures, is found the best; and for general application the following is recommended:—

Farmyard manure, 10 tons.
Sulphate of ammonia, 1½ cwt.
Superphosphate (30 per cent. soluble), 4 cwt.
Muriate of potash (50 per cent. potash), 1½ cwt.
Costing about 48s. per acre for the artificials.

For the guidance of farmers who might prefer to buy the mixture ready prepared from a manure merchant, it may be mentioned that it would yield the following analysis, which should be guaranteed:—

Ammonia, 5 per cent.
Soluble phosphate of lime, 17 per cent.
Potash (pure), 16 per cent., and cost about £7 per ton.

If it is not convenient to a grower to supply a dressing of farmyard manure, then he can get satisfactory crops by the use of artificials alone; but this course cannot usually be recommended unless the land is well-stored with humus, as in the black soils or in those soils which have been liberally treated with farmyard manure in previous years.

If artificials alone are used, the following mixture is recommended:—

Sulphate of ammonia, 2½ cwt.
Superphosphate (30 per cent. soluble), 6 cwt.
Muriate of potash, 2¼ cwt. per acre.

This mixture of 10¾ cwt. per acre would yield:—

6 per cent. of ammonia;
17 per cent. soluble phosphate;
10 per cent. pure potash;

and, if supplied by a manure merchant, ready mixed, should cost about £8 per ton.

The Departmental committee suggests that the artificials should be broadcasted across the drills before the potatoes are set. When the mixing is done on the farm, the operation should take place immediately before the fertiliser is required for sowing.

These mixtures contain a very ample supply of potash, and on rich soils, especially when farmyard manure is applied, the potash might be reduced by one-third without prejudice to the crops.

NEGLECTED INDUSTRIES.

CHICORY.

Most people are aware that large quantities of chicory are used for mixing with coffee, and the generality of European, American, and Australian coffee-drinkers prefer the flavour of "chicoried" coffee to the pure ground coffee. The chicory plant, although it grows well in tropical Queensland, is not an exclusively tropical production. In its wild state it has a very wide range, and in Europe and Asia this is only limited by the Arctic regions and, as was formerly believed, by the tropics; but we have ourselves seen chicory growing luxuriantly near Hambledon, in the tropical district of Cairns, where chicory was also prepared for market.

The chicory plant is a hardy perennial, bearing beautiful blue flowers on a stem often 5 ft. high. The land for this crop should be got ready in August, and during that month the seed is sown in drills about 2 ft. apart, sometimes only 16 in. apart in Europe. When the young plants appear, should they be attacked by slugs or snails, which are very partial to the succulent young leaves, the usual remedy in the shape of spraying is adopted. Before the leaves cover the ground, the plants must be thinned out, and those removed may be transplanted. Then the intervals between the rows must be kept clear of weeds either by forking or by the use of a scarifier. The value of the plant lies in its root, although the young leaves are largely used in France, Belgium, and other Continental countries as salad. The plant has a thick, white, fleshy taproot, and thrives in any soil which will suit carrots, parsnips,

arrowroot, cassava, &c. The roots come to maturity in from five to six months, and are then ready to be taken up and dried.

In England the weight of the crop ranges from 3 to 5 tons per acre, but the American reports give 15 tons per acre as an average. Certainly such a crop has not been obtained in Australia; so the yield must be taken as a mistake or as an exaggeration. There are several varieties of chicory, the best being called "whitloof," meaning "white leaf," which forms a head very similar to that of the Cos lettuce. It is also called the "large-rooted brussels" chicory, from its thick, stubby root. The young roots may be boiled and eaten like parsnips. The leaves form excellent fodder for cattle and sheep.

The chief commercial use of chicory is in the form of the dried, roasted, and powdered root as a substitute for or as an adulterant of coffee.

To prepare it for this purpose, the root is first cut into small pieces, dried in a kiln, and then roasted in revolving iron cylinders. In North Queensland, or even in the South, the sliced roots may be perfectly dried in the sun. The loss between the weight of the fresh and that of the roasted root is from 25 to 30 per cent. During the roasting, 2 lb. of lard to every cwt. of chicory are added to give it a lustre like that of coffee. The powder looks very like ground coffee, and has a strong odour of liquorice.

There is a market for dried chicory, we believe, in this and in the Southern States of the Commonwealth.

ARTIFICIAL RUBBER.

NO SWORD OF DAMOCLES.

Mr. Gustave van den Kerckhove, the well-known rubber expert, makes some apposite comments in "Bulletin de l'Association des Planteurs de Caoutchouc" for March on the determined efforts of chemists and financiers to secure an artificial rubber. It is a widespread error that these efforts were due to the rubber boom. In the course of the last twenty years, hundreds of samples of artificial caoutchouc have passed through Mr. Kerckhove's hands, and not once has he found the artificial in any way comparable with the natural article. He is prepared to pay homage to the obstinate searchers after the synthetic which shall do what nature does, but, as he points out, they can never give it the life and nerve which belong to the real thing. Planters of rubber-trees need not worry themselves; artificial rubber is not the sword of Damocles, declares Mr. Kerckhove. Despite all that has been attempted in England, Germany, France, the United States, and Belgium, synthetic energy, he says, has only created a mirage: "Artificial rubber seen looming in the distance looks something; when approached it is nothing."—"Rubber World."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF MAY, 1912.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lerida ...	Ayrshire	4 Mar., 1912	1,016	4·0	45·40	
Redrose ...	Shorthorn... ..	23 Mar. ,,	795	4·2	37·40	
Lady Margaret	Ayrshire	4 May ,,	849	3·9	36·95	
Miss Hayden	Shorthorn... ...	21 Mar. ,,	753	4·0	33·65	
Nellie II. ...	,, ...	1 Feb. ,,	713	4·1	32 69	
Davidina ...	Ayrshire	29 Dec., 1911	734	3·9	31·94	
Lavinia's Pride	,, ...	23 Feb., 1912	674	4·0	29·40	
Glen ...	Shorthorn... ...	30 Sept., 1911	506	4·9	27·97	
Laura ...	Ayrshire	6 Mar., 1912	647	3·8	27·39	
Miss Jean ...	,, ...	10 Apr. ,,	629	3·9	27·37	
Burton's Maid	Shorthorn... ...	2 Feb. ,,	555	4·1	25·45	
Daisy ...	Holstein	2 Feb., 1911	613	3 7	25·23	
Lark ...	Ayrshire	29 Nov. ,,	534	4·2	25·11	
Queen Kate	,, ...	9 Feb., 1912	518	4·2	24·36	
Butter ...	Shorthorn... ...	6 Nov., 1911	506	4·2	23·80	
Lady Morton	,, ...	9 Feb., 1912	527	4·0	23·55	
Miss Lark ...	Ayrshire	17 Jan. ,,	499	4·2	23·47	
Flora XVII.	Jersey	10 Feb. ,,	508	4·1	23·30	
Honeycomb	Shorthorn... ...	29 Aug., 1911	491	4·2	23·09	
No. 6 ...	,, ...	12 Jan., 1912	516	4·0	23·05	
Mist ...	Holstein	2 Oct., 1911	521	3·9	22·67	
Dewdrop ...	,, ...	3 Nov. ,,	503	3·9	21·89	
Careless ...	Jersey	16 Dec. ,,	379	5·1	21·83	
Duchess Fanny	Shorthorn... ...	24 Aug. ,,	527	3·7	21·68	
Dilly ...	,, ...	9 Feb., 1912	476	4·0	21·26	
Burton's Lady	,, ...	7 Dec., 1911	471	4·0	21 04	
Lass ...	Ayrshire	16 Oct. ,,	447	4·2	21·04	
Silver Nell ..	Shorthorn... ...	13 Dec. ,,	452	4·1	20·23	
Bracebridge I.	,, ...	16 Mar., 1912	465	3·9	20·23	

NOTE.—Butter, Nellie II., No. 6, and Redrose were fed with a daily ration of 30 lb. mixed chaff, 3 lb. bran, 3 lb. pollard. The rest of the dairy herd were on natural pastures only.

FEEDING YOUNG PIGS.

One of the secrets of success in raising young pigs is to feed often and little at a time. Anyone not thoroughly acquainted with pigs would be surprised at the very great number of times during the twenty-four hours a sow suckles her little pigs. For this there appear to be at least two good and sufficient reasons—one is, that the sow is unable to carry a large quantity of milk for her numerous family; and the other, that the stomach of the pigling is not capacious enough to stow away any great quantity of food at one time.

As the pigs arrive at weaning time, we generally mix with the sharps a small proportion of meal; this we increase as they grow older, until at, say, ten weeks old the youngsters will thrive well on one-fourth meal and three-fourths sharps.

One most important point in connection with the management of young pigs is the general belief amongst buyers of fat pigs that the meat from a pig which has been allowed, as is far too frequently the case, to live a considerable time as a store pig in the hope—vain though it may be in the majority of instances—that the growing pig will eat and pay for certain odds and ends about the farmyard that would otherwise have been wasted, is inferior meat. The bacon-curers are stated to place a higher value per stone on those fat pigs which are fattened early in life on the concentrated system of feeding—*i.e.*, in such a manner that they never receive a check, and are, therefore, fat at a much earlier age than the ordinary pig of the country. The breeders and feeders of pigs must continually bear in mind that the only hope of making pig-keeping really profitable lies in their producing pork of the best quality, and this can only be accomplished by breeding from those animals alone which are possessed in a marked degree of those points such as early maturity, quick growth, fine quality of bone and offal, and then by so feeding the animals that every advantage is taken of the two former essential qualities in their feeding stock.

A pig should make 1 lb. in weight for every day of its life. If it does this, it is ready for market at any time after it is six months old. For the summer markets, heavy weights are not wanted. Six or eight months should be sufficient to make all the growth desired.

Give the pigs exercise while they are growing. Give them access to salt, sulphur, and ashes. Do not overfeed at any time, and, when they have made size, fatten them as rapidly as possible, and sell them the day they are finished for market.

To secure the greatest gain in feeding pigs that are still suckling, it is necessary that the sows be fed all that they will eat up clean. It is often the case that, when pigs begin to eat, the sows are stinted. It pays better to feed two lots of pigs during the year to 200 lb. than one lot to 400 lb. Young pigs pay better than old ones for the food they eat, and make better meat. Light, lean pork encourages the use of pork, and out of increased consumption come better markets for the producer. The older the pig, the more its cost to sustain growth, because there is more to sustain. Instead of the rate of growth increasing with the weight of the animal, it diminishes, and every additional pound of growth costs more until the point of profit is reached.

It matters not how well cared for in other respects, the pig will never be thrifty unless he has plenty of pure, fresh water. This important point is, perhaps, more often neglected than any other. Slop will not answer the purpose of drinking water entirely, though it is,

of course, a partial substitute. The man who will pen up pigs, or any other animals, in a field entirely destitute of shade ought to receive the attention of the Society for the Prevention of Cruelty to Animals. Such protection from the sun as a wire fence is hardly sufficient. Shade trees here and there, or a rough shed, are necessary. The man who produces the largest amount of pork at the least cost, and that of the best quality, will make the most profit. The chief item in the bill of cost is feed. Generally, the cheaper the feed, the greater the profit. Corn (maize, that is) is not the cheapest feed in this country, nor does it, when fed exclusively, make the best quality of meat for the best market. A varied diet of grass and other green and succulent products, containing more flesh-forming constituents than corn, will be found cheaper and to make better pork—corn for lard, and grass for meat.

The kind of feed and the care the dam receives while the pigs are in the embryo state have much to do with the size, character, constitution, and value of the litter. She should have plenty of exercise, and this is best secured in a stubble sod field that is intended for fallowing in the following season. A stubble field is a splendid place to winter the brood sows, if they have access to a straw stack for shelter. If they are not ringed, all the better; they will root a little, perhaps, but all the better for the ground. Pigs confined in small muddy yards take too much earth and filth into the stomach, and, as a consequence, the bowels become constipated, the system fevered, and indigestion follows, with loss of appetite. The carcass of a pig in this condition gets smaller, while hair and bristles grow just the same, giving the pig some resemblance to a porcupine. The natural food for pigs in a wild state is grass, roots, and bulbs of plants. The necessity for this character of food is well recognised by Nature in providing the pig with a rooter for the purpose of obtaining it. Even after generations of domestication, with an ample supply of sustenance to satisfy all demands, this proclivity or desire to root, independent of necessity, remains a prominent characteristic. Farmers who have practised from this pointer—and during the winter months have, at stated intervals of at least twice a week, given one feed of potatoes, beets, artichokes, or turnips—have found that the pigs not only relish them, but derive great benefit from them. They are conducive to a perfect condition of the system, stimulating the action of the various organs in the performance of their functions. They aid in the digestion and assimilation of the more solid food. Brood sows are especially benefited by a regular supply of root diet while pregnant as well as their young. Indeed, it is almost compulsory to ensure strong, healthy pigs and a natural farrow. Lumps of salt should be placed within the reach of all pigs, and a little sulphur mixed with their food will have a beneficial effect. They are also extremely fond of coal cinders, and they will even eat coal itself; this assists digestion. Pigs should also, as stated, be supplied with pure, fresh water, and the water trough should be frequently cleaned out. If cleanliness, plenty of fresh air, clean water, regularity of feeding, and shelter be attended to, you will not be troubled with much disease or death among your pigs.

COWPEAS FOR SWINE.

When cowpeas are planted for green manure, it is an excellent practice to turn pigs into the field about the time when the first peas are ripening. Young pigs thrive amazingly on the succulent foliage and well-filled pods, and the quality of pork raised on such a healthy and nutritious diet is very fine. This is a profitable method of fattening pigs, or of preparing them for topping off with corn or sorghum for market. An acre of ripening cowpeas will pasture from fifteen to twenty pigs for several weeks, and the gain in fertility from the droppings of the animals during that period will more than counterbalance the fertilising value of the forage eaten. The rapid increase in weight will thus represent so much clear profit, and the farmer is richer by half a ton or more of prime pork for every acre planted. In the United States pigs are turned out to pasture just as dairy cattle and horses are in this country. This method has been very successful, and it would be well for our farmers to adopt this system, which has been introduced at the Queensland Agricultural College. Cowpea is well known in this State, and has been largely cultivated, but it is apparent that, notwithstanding the opportunities that our farmers possess for improving the management of their farms, little advantage is taken of the experience of others who have made a success of a certain branch of agriculture. There is money in the breeding of pigs, and the farmer who intends breeding should endeavour to study what is required for local purposes. Pigs require wood ashes for their best interests.

DANGERS OF SWILL FEEDING.

Pig-feeders who live either in or near large towns invariably do their share of swill-feeding. Examination of the swill taken from hotels and refreshment-rooms will often disclose broken glass, tins, &c. Now, when these happen to get into the feeding trough, the pig, feeling something lumpy, naturally makes a dive for it, seizes it, and crushes it. The result is that it generally gets badly cut, and, its mouth becoming sore, it is thrown off its feed. Some feeders think that to examine swill is time wasted, but it will take a lot of time so wasted to pay for a pig if lost by accidents of this kind.

FEEDING EXPERIMENTS WITH THE YORKSHIRE, BERKSHIRE, AND TAMWORTH BREEDS.

It will interest breeders of pigs to know how the three leading breeds—the Yorkshire, Berkshire, and Tamworth—fared in experiments made at the Ontario Agricultural College. The experiments lasted for four months—July to October; and the animals (thirty-six in number) were about eight weeks old when put under trial. The different lots were fed on exactly the same foods (consisting largely of peas, pollard, and whey) all through the experiment. The results showed but little advantage in favour of either of the breeds tested; the average gain during the 112 days over which the experiment extended ranged from

117 to 123 lb., or a little over 1 lb. per pig per day. The Large Yorkshire headed the list with a total gain of 123¾ lb. in the 112 days, the Berkshire coming next with a total gain of 120 lb., and the Tamworths third with a total increase of 119¼ lb. An instructive feature of the experiment was the result obtained as to the quantity of food required by each breed in order to produce a certain quantity of pork. The quantity of grain food consumed to produce 100 lb. of weight ranged from 350 to 383 lb.; Yorkshires standing at the head of the list as requiring the smallest quantity of grain, the Berkshires second, Duroc Jerseys third, and the Tamworths fourth.

THE RESULTS.

Breed.	Total Gain per Hog in 112 Days.	Average Daily Gain per Hog.	Meal consumed per 100 lb. Gain.
1. Yorkshire	123.75	1.10	350.1
2. Berkshire	120	1.07	369.79
3. Tamworth	119.25	1.06	377.77

The above table gives the detailed particulars on this score in the case of the three breeds which possess any practical interest for our readers.

HOW THE YORKSHIRES TURNED OUT.

Great length, side of even depth throughout, sides full of flesh, great length between shoulder and ham, fat even on the back, bone moderate, head small, forearm too long, belly only moderately thick, shoulders moderate in size. These pigs have qualities which make them peculiarly suitable for cross-breeding purposes on account of their great length, great development of flesh, and even depth of the side.

HOW THE BERKSHIRES FARED.

Flesh well developed, fat even down the back, well-developed sides of reasonably even depth, rather irregular in length, head moderate with rather large jowl, bone moderate; generally good hogs; but show a decided tendency tendency to uneven development, as evidenced by the great irregularity in the length.

THE TAMWORTHS.

Moderate bone, a long head but small jowl, flesh well developed, slight tendency to fat to arch on the crown, which would possibly cause too many sides to be classed as "fat" on account of thickness at this one point if hogs were moderately well fed, belly thick and very excellent; generally a desirable type of hog, which, with judicious feeding, ought to make good export sides.

COST OF PRODUCTION.

In this experiment a rather interesting point was brought out. It has been shown by other experiments that the cost of producing 1 lb. of gain in pigs increases as the animal becomes heavier. As the animals included in this test were weighed at regular intervals, and as every pound of meal which they consumed was carefully weighed, an opportunity was afforded to test further the truth of the claim, and a statement of the results is given below. These results are computed from the gains made and the food consumed by thirty-six hogs, so that they afford very conclusive evidence. In computing the average weights of the hogs, fractions of pounds were neglected, the nearest whole number of pounds being taken in each case:—

While increasing in live weight from 54 lb. to 82 lb., the pigs required 3.10 lb. meal per 1 lb. gain.

While increasing in live weight from 82 lb. to 115 lb., they required 3.75 lb. meal per 1 lb. gain.

While increasing from 115 lb. to 148 lb., they required 4.38 lb. meal per 1 lb. gain.

While increasing from 148 lb. to 170 lb., they required 4.55 lb. meal per 1 lb. gain.

This statement shows that there is a steady increase in the amount of meal required to produce 1 lb. of gain as the hogs increase in weight, and is a strong argument in favour of marketing hogs by the time or a little before they reach 200 lb. in live weight.

In rearing and fattening pigs, the following data may be considered:—

Take a young pig weighing 20 lb. dressed weight, at 6d. per lb., equal to 10s.; 5 lb. of wheat will add 1 lb. of pork to its weight, and 400 lb. of wheat will make 80 lb. of pork; total, 100 lb.; value, say, 4½d. per lb.; equal to £1 17s. 6d. Then we have cost of pig, 10s.; cost of 400 lb. of wheat, say, 16s. 8d.; total cost, £1 6s. 8d., giving a profit of 10s. 10s. ....

Now, take a grass-fed pig weighing 100 lb. dressed, value £1. It would need 6 lb. of wheat to add 1 lb. of meat to his carcass, and 600 lb. of wheat to make 100 lb. of pork. We can reckon this 200 lb. as worth 3d. per lb., equal to £2 10s. The cost of the pig is £1; of wheat, £1 5s.; total, £2 5s.; thus showing a profit of 5s. only. So it would not appear to be wise to buy store pigs for fattening. The pure Berkshire will pay better to breed and to fatten than the Berkshire and Essex cross. Great care should, however, be taken in selecting the animals. Always, if possible, get them from a person who takes care of his stock.

ADVICE ON THE ROUTINE OF THE DAIRY.

By E. GRAHAM, Dairy Expert, Department of Agriculture and Stock.

[CONTINUED.]

All milk and cream should be subjected to prompt cooling, and no unnecessary delay should be allowed to intervene between the time the milk is drawn from the cows and the actual application of the cooling and aerating process.

The climatic conditions under which the milk or cream supplies of this State are raised are such as demand that the practice of cooling should form part of the daily routine of the dairy.

Milk and cream, no matter how perfect in flavour at the outset, are highly perishable products; and changes of a deterioratory nature will speedily take place unless systematic action is taken to arrest the natural alteration in quality.

All things being equal, the deterioration to which milk and cream are subject is largely governed by the temperature at which these products are held.

The lower the temperature maintained, the longer will the milk or cream remain sweet and sound in quality.

The process of cooling may be carried out in the following manner:—

From an elevated receiving vat the milk, or from the separator spout the cream, may be conducted over any of the standard coolers. These are of various designs, and permit of the milk or cream passing in a very thin layer over a more or less extensive surface, the inside of which is usually cooled by a circulation of cold water.

This process, if rightly carried on, may accomplish two things—(*a*) The rapid cooling of the milk or cream; (*b*) the elimination of odours therefrom.

The importance of the cooling and aeration of the milk or cream is obvious, but the air and surroundings where it is done must be pure and clean.

The milk or cream in transit from farm to factory must be fully protected from the sun's rays.

The hauling of milk and especially cream for long distances is a necessary condition imposed upon dairymen and cream-collectors in many parts of Queensland.

Unfavourable temperature conditions extend over a large portion of the year, and some means of protection of the dairy products from the hot sun is absolutely essential.

It is much the better method to have a hood or cover attached to the conveyance in which the milk or cream is carried than to place a covering directly over the cans.

The former method allows of a current of shaded air to pass between the cans and the protecting shade cover—an advantage not to be gained when the covering rests directly on the cans.

All that has been said thus far as pertaining to the improvement of the milk supply applies with just as much force to the production of wholesome cream. While the cream represents only a small proportion of the original milk from which it was extracted, it has a comparatively higher commercial value, and any unfavourable influence incident to the production of the milk is usually to be detected in the cream.

In diverting our attention more directly to the production of cream, we will first take the separator, the medium whereby the butter fat is won from the milk.

In common with any other piece of apparatus used in the treatment of milk or cream, the separator must be kept scrupulously clean. The disastrous effects of using a foul separator bowl can be imagined only when we recall the fact that all cream passing through it becomes seeded with the bacteria it contains.

Unless the cream is subsequently pasteurised, the harmful germs introduced into the cream are certain to develop injurious flavours that are ultimately carried into the resultant butter, which, as a consequence of the injury to its qualities, realises less than first-class market quotations.

This one cause of bad flavours in butters alone, accruing from neglect to always cleanse the separator bowl after use, levies a heavy toll upon the butter industry in this State, and the loss could be easily obviated.

The bowl and the milk-soiled parts of the separator must be taken apart and washed every time the separator is used. This is imperative not only for sanitary but for economic reasons, as will be pointed out later.

Where a separate dairy-house is available, the separator is best placed there, and not operated in a partitioned portion of the milk shed or in any place where the air or the surroundings are imperfect.

I have seen farm separators placed in dilapidated outbuildings and even out of doors, where they serve as lodging-places for dust and filth at times when the machine is not in use. Nothing could be more antagonistic to good quality of the cream—in fact, such conditions are contrary to law, and place the owner liable to prosecution.

A simple clean room with impervious sloping floors, well ventilated, fitted with screened windows and doors, and with good drainage, can be made to well serve as a place wherein to separate the milk. Further, the initial cost of the separator is of itself sufficient to emphasise the need of protecting the machine from harmful influences.

Every separator supplied to the dairymen is usually accompanied by specific directions for guidance in both setting up and operating the machine. The instructions given should be carefully followed.

Assuming that all parts of the machine are properly adjusted, the first requirement is a firm foundation. With care most hand sizes of separators can be set upon solid wooden floors so as to run satisfactorily. Unless it is a firm floor without vibration, it will not do. A concrete

pier, with bolts embedded for attaching, say, 2 in. by 4 in. or 4 in. by 4 in. pieces of hardwood to which the separator may be lagged, is a satisfactory method, as all vibration is thus avoided.

Pieces of 2 in. by 4 in. hardwood bolted to a cement floor may be made to serve as well.

Care must always be taken to set the frame perfectly level, as otherwise the bowl will not be properly balanced and fail to run true.

Placing a machine upon skids or a foundation of a temporary nature is, to say the least, a questionable practice.

ANGORA GOATS.

Of common goats there are, according to the Government Statistician's report for 1910-11, some 168,339 depastured in the State, and from amongst these many white nannies have been selected for the purpose of the production eventually of pure Angora goats. This valuable breed is steadily, if slowly, coming to the front. Each year witnesses an increase in the number of animals and the quantity of mohair, as is shown by the following table published in the Annual Report of the Under Secretary for Agriculture and Stock for the year 1910-1911:—

Year.	Number of Animals.	Mohair Obtained—Lb.	Skins Obtained.	Number Killed for Meat.
1904	2,008	1,216	208	497
1905	2,855	902	320	643
1906	2,512	1,358	160	475
1907	4,589	3,073	996	1,028
1908	7,698	5,102	980	1,181
1909	8,228	6,547	1,374	1,739
1910	9,088	7,096	1,753	1,823

We are frequently asked where Angoras may be purchased. The districts whence the greatest number were returned are:—Dalby, 1,093; Banana, 1,087; St. Lawrence, 988; Emerald, 799; Rockhampton, 594; South Brisbane, 531; Eidsvold, 410; Springsure, 317.

Again, innumerable questions reach us from time to time as to profits to be derived from breeding Angoras, the most suitable climate, the prolificity of the goats, the amount and value of mohair they will produce annually, &c.

These questions have been frequently answered; but, for the benefit of the many new settlers in districts which are eminently suited to the requirements of this valuable animal, we place before our readers the following "catechism," which was some time ago published in the "Stock Breeder" and condensed for "Garden and Field." Besides this, those interested in the subject will find exhaustive articles on Angoras in the volumes of this journal from Vol. V. to Vol. XXIV.

What we have called the "catechism" on Angoras is as follows:—

1. Are Angora goats more profitable than sheep?

Angora goats are more profitable than sheep where your range is too rough, poor, and brushy for sheep, and especially if you want to run cattle and horses on the same range and leave the grass for the larger animals. It is very profitable to run some goats with sheep, particularly where there are more or less brush and weeds in the sheep range.

2. Are they more troublesome to raise than sheep?

They are less troublesome to raise than sheep when you have learned how to manage them.

3. Should they always be herded?

Angoras can easily be trained to come home at or before sundown, and are more regular about their homecoming than any other kind of stock. And where there are no wolves or other kinds of animals they need not be herded.

4. Can they stand a cold climate?

They stand more dry, cold weather than any other kind of stock, and should always have a dry shelter during cold rains.

5. Do they protect themselves against wolves and dogs?

They will protect their young kids quite bravely, but when overpowered will give up the fight and run.

6. Is their meat as good as mutton?

The meat of the Angora is not surpassed in flavour and wholesomeness by any other flesh in the world, and many people believe it surpasses all other meats.

7. Must they be fed in winter?

On good range the Angora needs no other feeding.

8. Are they as prolific as sheep?

Generally the Angora doe brings but one kid annually, unless there are twins.

9. What is the average price of mohair?

Good mohair from well-bred goats brings from 1s. to 1s. 8d. per lb. in New York, according to quality and demand.

10. How old should Angora mutton be when sold to the butcher?

If you have only a few Angora muttons you can sell to your neighbours what you do not use yourself, but it pays better to keep them to raise mohair until they are eight or ten years old, especially in the south (Southern States, U.S.A.), where they are shorn twice a year.

11. How much mohair will the Angora produce yearly?

A good, well-bred Angora should shear 6 lb. a year on good range.

12. How many Angoras can be kept to the acre of brush land pasture?

On good range where there is plenty of weeds, herbs, small trees, brush, and other thick undergrowth, you can raise about five goats to the acre, but they should not be kept too long on the same range—at least no longer than they keep "rolling fat" all the year. (These are American conditions.—Ed.)

13. Do Angoras need running water?

Running water is best for goats, but tank water will do where it is not befouled by manure, mud, &c.

14. To what age can they be profitably kept?

It pays to fatten Angoras for meat and their pelts at fourteen or fifteen years of age.

15. Are they dainty as to what they eat?

They will eat any kind of food that is good for cattle.

16. Are they subject to disease?

Angoras are as healthy as any animals in the world.

17. Is it hard to keep them within a fenced pasture?

They are not so easily kept fenced in as sheep, but a straight, upright rail, board, or wire fence, 3½ ft. high, will hold them if there are no holes large enough to crawl through. They will climb over or crawl through, but will never jump a perpendicular fence.

18. Is it troublesome to make the does own their kids?

Does that are soon to bring kids should be kept in a separate pasture until the kids are a few days old. If handled in this way, there is little trouble over their not owning their kids, as they generally show great affection for them.

19. Will a doe give more milk than one kid will suck?

The first few days after kidding it is necessary to milk the deep milking does until the kid is large enough to take all the milk.

20. Can they easily be broken for milking?

Goats can easily be trained to jump upon a box or bench to be milked, and their milk is said to be the most wholesome of any milk in domestic use.

21. Are the bucks bad about fighting?

I never owned an Angora buck that ever offered to fight anybody. They will fight each other, and sometimes fight dogs, wolves, hogs, &c.

22. Will the goats come home at night?

They will come home before sundown with more regularity than any other farm animal.

Poultry.

EGG-LAYING COMPETITIONS IN THE SOUTHERN STATES.

ROSEWORTHY AGRICULTURAL COLLEGE, S.A.

The following are the names and scores of those pens which exceeded 1,200, which is in these days considered the limit below which no pen with any pretensions to class can go; still a good many of them manage to do so sometimes:—

ROSEWORTHY FINAL SCORES.

Six pullets in each pen. Eggs laid for the month of March and the year from 1st April, 1911, to 31st March, 1912:—

LIGHT BREEDS, WHITE LEGHORNS (EXCEPT WHERE OTHERWISE SPECIFIED).

	Total.
Redfern Poultry Farm	1,589
Mrs. P. A. Uren	1,319
A. H. Padman	1,297
Moritz Brothers	1,289
C. B. Bertelsmeier	1,270
G. A. Collins	1,269
Range P. and E. Farm	1,257
E. W. Hurford	1,256
C. A. Collings	1,240
A. J. Cosh	1,234
C. Hay	1,229
J. Ellery and Son	1,227
W. P. Eckermann	1,224
R. Carling	1,217
W. Purvis	1,212
P. Sickert	1,204
C. B. Bertelsmeier	1,202
Miss G. Purvis	1,200

In the heavy-breed section owners have no doubt been seriously disappointed, for the following seven pens are the only ones which made even a respectable showing:—

HEAVY BREEDS.	Total.
Craig Brothers—Black Orpington	1,189
G. Toseland—Langshan	1,121
B. P. Martin—Black Orpington	1,102
E. McKenzie—Black Orpington	1,084
S. Brundett—Black Orpington	1,068
Killara P. Farm—Black Orpington	1,047
E. V. Cant—Silver Wyandotte	1,021

In the light-breed section, 1,200 and over, there are several new names; and Mrs. P. A. Uren is to be particularly congratulated on the excellent showing made by her birds. Mr. Padman, one, of course, expects to be at least as high as his name stands on this list. Messrs. Moritz Brothers are no strangers to one of the top places in competition lists. Mr. C. B. Bertelsmeier has, of course, been there before, only more so, for he was the joint holder of the South Australian record of 1,531, which Mr. Walsh has just upset. Other competition winners—Mrs. A. E. Kinnear and Ontario Poultry Farm—are both so low that it is kinder not to disinter the actual figures. We hope that this eclipse is only temporary.

The following summary of results will be interesting to those of a statistical turn of mind. They will be found useful in proving more or less conclusively either that poultry pays or that it does not:—

Summary of Roseworthy Results.

Number of birds (126 pens), 756; total number of eggs laid, 133,093; value, £545 6s. 3d.; cost of feeding, £188 14s. 9d.; profit over cost of feeding, £358 11s. 5d.; average eggs laid—per pen 1,056.29, per hen 178.04; cost of food per pen of six hens, £1 10s.; profit over cost of food per pen, £2 16s. 8d.; eggs laid by winning pen, section I., 1,589; highest monthly score, 163 eggs; highest weekly score, 40; total weight of eggs laid, 17,323 lb.; average weight, 2.09 oz.

KYBYBOLITE.

Messrs. Moritz Brothers' lead at this competition was not so marked as was the case at Roseworthy, but was nevertheless a very comfortable one almost from start to finish. It is interesting to note the relative scores of housed and unhoused birds entered by the same owner, and also the housed birds this year with those which competed last year under much more trying conditions. The value of adequate housing is plainly shown, though, unfortunately, the actual profit of so doing is not so manifest.

The following are the prize-winners in this test:—

Kybybolite Prizewinners.

Light Breeds: Moritz Brothers, 1,464 eggs, £10; H. F. and A. C. Vorwerk, 1,306 eggs, £5; "Mahama," 1,274 eggs, £3; J. Jarrad, 1,196 eggs, £2; Sargenfri Poultry Yards, 1,191 eggs, £1. Heavy Breeds: Mrs. D. McNamara, 844 eggs, £10; H. Bail, 783 eggs, £5; S. Staunton, 774 eggs, £3; A. Phillips, 748 eggs, £2; Mrs. D. McNamara, 717 eggs, £1. Prize for heaviest total yield of eggs, Moritz Brothers, Kalangadoo; score, 1,464; weight of eggs, 190 lb., £3.

BURNLEY (VICTORIA).

It cannot be said that this competition started under very favourable conditions. There were many unsatisfactory rumours, and a whole set of disasters was foretold. However, the clouds rolled by, as clouds have a way of doing, and the Victorian Government, who organised the competition through their expert, have the satisfaction of knowing that excellent figures have been put up, and that much renewed interest in poultry breeding has been aroused. Its nearness to Melbourne has been a point in its favour, and we read that immense numbers have visited the contest. Coming to figures, the outstanding feature is that three pens have passed the 1,500 mark. This is the first time this has been done in competition history. Mr. Pope, the winner, has the satisfaction of knowing that he beat the previous world's record by two, his score being 1,566. He was unfortunate, however, in that Mr. Walsh's pen over this side had been even a little more busy, so that though he beat the old record he does not hold the new one. Mr. Swift was the second, and he was well over 1,500; whilst Mr. A. J. Cosh, of South Australia, put up the third of the big totals.

HAWKESBURY (NEW SOUTH WALES).

One always looks for solid results rather than sensational records in the Hawkesbury competition report. Mr. Thompson does not waste time over abstract problems, but gets down to the bones of the matter in very few words. One point of great interest during the last competition has been the test carried on between ten pens meat-fed and ten pens fed no meat—all being of the same breeding, and the management and feeding being the same. At the commencement of the test the opinion was freely expressed that the no-meaters had not even Buckley's chance; now, however, that the numbers are up there is quite a different story to tell, and the figures are certainly instructive. It would, of course, be a mistake to take the figures as final, but they are certainly an indication that too much stress has been laid on the meat ration for poultry.

The test was for a period of twelve months, and finished on 31st March, with this result:—

	No Meat.	Meat Fed.
Total eggs laid	11,112 ..	11,665
Average per hen	185 ..	194
Market value of eggs per hen ..	18s. 10d. ..	19s. 4d.
Cost of feed per hen	5s. 10d. ..	6s. 1½d.
Profit over feed per hen	13s. ..	13. 2½d.

As regards the general condition of the hens at the finish, the conductor says:—"No appreciable difference was to be noted at the close."

For several years the test of the relative laying of first, second, and third year hens has been carefully tested, and much that is of interest has been observed and recorded. The accumulated results may be said to indicate that on the question of profit there is little difference between the first and second year hen, taking into account, of course, the first six unproductive months of the hen's life. To anyone contemplating poultry-keeping on anything like a large scale, the settlement of questions such as these is of very great value. The actual figures for this year are as follows:—

Average Eggs per Bird.—First year, 300 pullets, 184; second year, 180 hens, 140; third year, 60 hens, 130.

Profit over Cost of Food per Bird.—First year, 300 pullets, 8s. 7d.; second year, 180 hens, 8s. 3d.; third year, 60 hens, 5s. 8d.

THIS YEAR.

The record entry for the present competition at Roseworthy is a fairly solid answer to those who predicted a year or two back that interest in competitions was on the wane. As far as the general public is concerned, it is probably correct, but any test which can draw competitors from all parts of the Commonwealth, including the Victorian Invading Army, is doing good work for more and better poultry. We do not believe that it can be maintained that our competitions, as at present conducted, are doing the most possible good for the industry. It may, of course, be true that what is being done at Hawkesbury need not be duplicated elsewhere. That argument is, however, we think, fallacious, and in any case there are many problems in poultry work. We hear that the birds sent up are, if anything, a more representative lot than has been the case in any other competition. Competitors at last appear to pretty generally understand that maturity as apart from actual age is an important factor. To those who have commenced well, we wish good fortune; and to those who have not commenced, a little bit more of the same.—" Garden and Field."

REPORT ON EGG-LAYING COMPETITION, Q.A. COLLEGE, MAY, 1912.

One thousand eight hundred and forty three eggs were laid during the month. Some of the birds have gone into moult, the pens most affected being those owned by Wilson, Cornish, Craig, and Yangarella. Mr. Bradburne's pen wins the monthly prize with 125 eggs. The following are the individual records:—

Competitors.	Breed.	May.	Total.
A. H. Padman, Adelaide, S.A.... ...	White Leghorns ...	95	213
Mrs. Beiber, Childers	Brown Leghorns ...	107	199
W. D. Bradburne, Bexley, N.S.W. ...	White Leghorns ...	125	175
J. Gosley, Childers	Do.	119	169
E. A. Smith, Paddington, Brisbane ...	Do. (No. 1)	103	165
A. T. Coomber, Bundaberg	Do.	87	162
B. Holtorf, Beaudesert	Do.	96	162
A. R. Wooley, Cairns, N.Q.	Do.	112	149
Range Poultry Farm, Toowoomba ...	Do. (No. 1)	89	137
E. A. Smith, Paddington, Brisbane ...	Do. (No. 2)	79	137
T. Fanning, Ashgrove, Brisbane ...	Do.	98	129
Mrs. Dredge, Bundaberg	Do.	82	129
H. Tappenden, Maryborough	Do.	57	118
R. Burns, Sladevale, Warwick	Black Orpingtons ...	97	117
J. Holmes, Toowoomba	White Leghorns ...	51	98
R. Burns, Warwick	S.L. Wyandottes ...	68	98
Yangarella Poultry Farm, Indooroopilly	White Leghorns ...	40	96
Cowan Bros., Burwood, N.S.W. ...	Do.	65	88
J. R. Wilson, Eudlo	Do.	41	84
W. W. Hay, Warwick	Black Leghorns ...	28	63
J. F. Dalrymple, Bexley, N.S.W. ...	White Leghorns ...	19	56
H. Hammill, Kogarah Bay, N.S.W. ...	Do.	41	55
Mrs. Sprengel, Boonah	Do. ..	41	45
Range Poultry Farm, Toowoomba ...	Do. (No. 2)	35	42
F. G. Cornish, Toowoomba	Do.	20	41
J. Zahl, Boonah	Do. (No. 1)	24	24
D. Grant, Boonah	Do.	18	18
Mrs. G. Craig, Miriam Vale	Do.	0	15
R. Burns, Warwick	Do.	4	6
J. Zahl, Boonah	Do. (No. 2)	2	2
Total	...	1,843	2,992

NOTES FROM WESTBROOK STATE FARM.

AN OLD MAN SALTBUSH—(*RHAGODIA PARABOLICA*).

All through the dry weather of 1911 (says Mr. Mitchell, manager of Westbrook State Farm), a few large clumps and a hedge about two chains long of saltbush known to pastoralists as "Old Man Saltbush" have grown luxuriantly here, and the plant has been proved to be of sterling value as a forage plant during dry times such as we have passed through. All farm stock eat it; cattle and pigs are especially fond of it; and as a salinous plant it is most valuable in aiding digestion, especially at a time when green feed is scarce and hay has to be resorted to as feed. *Rhagodia parabolica* is an erect shrub growing about 9 ft. high where it is not interfered with by stock. It is very densely clothed with foliage, and is very ornamental as a hedge plant. It stands cutting, and can be worked into any shape. Plants are easily propagated by seed or cuttings in early spring. Farmers would find a small plantation a most beneficial acquisition during time of drought.

[The true Old Man Saltbush is *Atriplex nummularia*, and is depicted in Vol. VI. of this journal.—Ed. "Q. A. J."]

State Farms.

TROPICAL FRUITS AT KAMERUNGA STATE NURSERY.

MANGOSTEEN.

By C. E. WOOD, Manager Kamerunga State Nursery.

In mentioning some of the fruit trees growing at the Nursery, I will begin with some that are not yet in bearing. I have seen it mentioned in the papers that this nursery should have, amongst other fruits, the Mangosteen, Sapodilla Plum, and Rambutan. As this was evidently written without first inquiring at this institution as to what trees were being grown, I may mention here that all these fruit trees have been introduced and are at present represented here. The Mangosteen (*Garcinia Mangostana*) has always proved a difficult subject to acclimatise, and even in Ceylon I believe it was a good many years before they got the first tree to fruit. Then, again, even if you have young plants, it is by no means an easy tree to transplant; otherwise this famous fruit would be found more generally distributed than it is. The tree at the Nursery is now about twenty years from the seed.

Fruit was sent over from Java, and seed planted; three plants were later put out in the field, but only one survived. Owing to the very slow growth made by this tree, special treatment was started about two years ago, artificial manures being used; and all through the dry season of last year the tree received daily watering all over. At the present

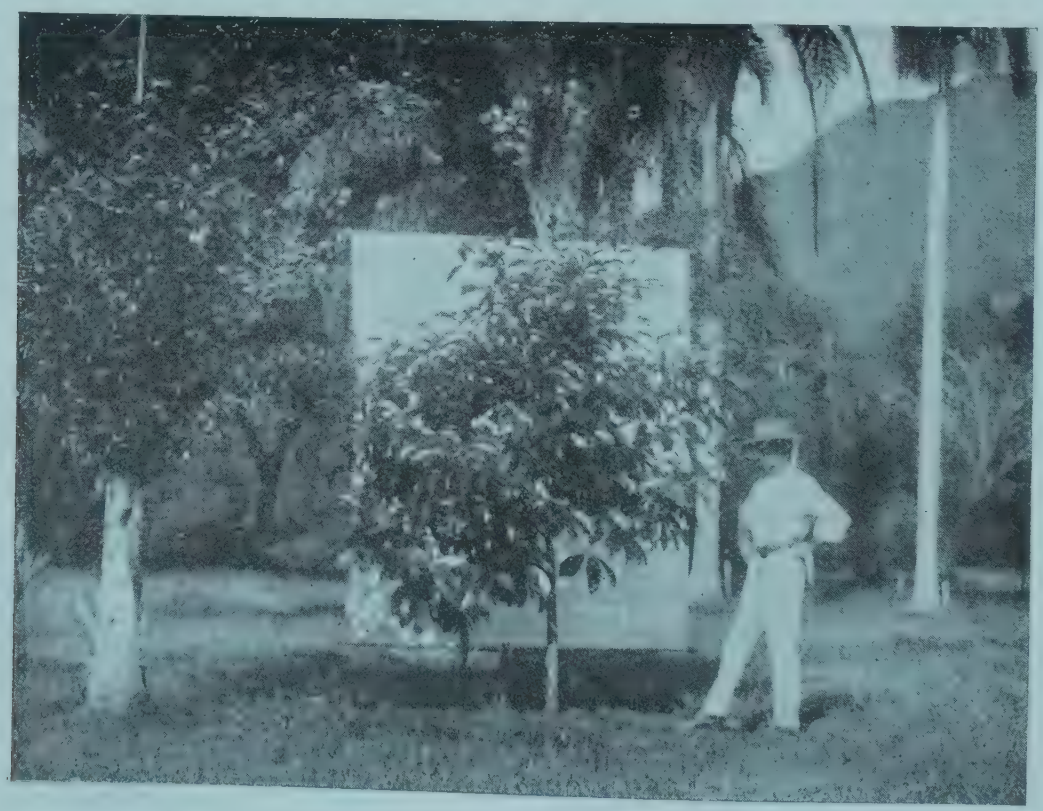


PLATE 1.—"GARCINIA MANGOSTANA" AT KAMERUNGA STATE NURSERY.

time the tree, though small (considering its age), presents a healthy appearance, and it is hoped that flowers and fruit will yet be produced. Up to the present I am unaware of anybody having a tree of *Garcinia mangostana* which has borne fruit in Australia; the so-called "Mangosteen" of Port Douglas and other places being the fruit of *Garcinia cochinchinensis* or *Garcinia xanthochymus*.

The accompanying photograph will give some idea of the tree *Garcinia mangostana*, and the following measurements will show it is answering to treatment:—

	Jan., 1910.	May, 1912.
Circumference of stems 3 ft. from ground	5½ in. ..	7 in.
Circumference of stems at base	8 in. ..	10 in.
Height of tree	6 ft. 8 in. ..	9 ft. 10 in.
Spread of branches	5 ft. 4 in. ..	8 ft. 9 in.

NITRO-BACTERINE.

By R. SOUTTER, Manager, Bungeworgorai State Farm, Roma.

Some few years ago, owing to the apparent danger (happily now passed) in the course of a short space of time of a serious shortage of nitrogen for agricultural purposes, through the exhaustion of our chief supply, the guano and nitrate beds, scientists set about to discover in what manner it could be met. Of course it was well known that the air would have to furnish the supply; but how it was to be obtained therefrom in a form available for plant food, in sufficient quantities and at a cost commensurate with what it was required for, was the greatest obstacle.

Professor Bottomley, of the Botanical Laboratory, King's College, sought the assistance of Nature, whom he assisted in return. He found that he could cultivate the nitrogen bacteria found on the roots of the leguminous plants, and prepare a culture for the farmer which would enable him to have the nitrogen of the air made available to this growing crop.

This culture he called nitro-bacterine.

Experiments were carried out with this culture here last season; but, as the weather conditions were extremely adverse for the propagation of the bacteria, very little benefits were appreciable in the results, and such as were may have been brought about by outside factors.

NITRO-BACTERINE—PROFESSOR BOTTOMLEY'S CULTURE.

The culture was prepared according to directions supplied, but the mixture did not turn cloudy until the fourth day.

As soon as it reached this state, some wheat and hairy vetch seed were dipped, dried in the shade, and sown.

No differences either in time of germination or percentage were noticeable between the treated and untreated seed.

Though the mixture is said to hasten maturity, no difference was noticeable in the wheat; the vetches were prematurely dried off upon the advent of summer in conjunction with the long dry spell.

MELVILLE'S TREATMENT.

In addition to the foregoing, sowings were made of seeds treated by Mr. J. J. Melville's process for hastening on the maturity of the resultant crops, and by whom the seeds were supplied to the Agent-General for Queensland. The following treated seed was received early in June:—Sample Black Oats, Irish Wheat, Canadian No. 1 Hard, and Red Essex.

Two sowings were made in well-worked soil sufficiently moist to promote germination; the first being on the 6th June, and the other on the 5th July.

In the latter part of July another two varieties were received and sown in August.

As in the previous experiment, the dry weather was the chief factor which prevented any valuable results being obtained, though there were others present which, even had favourable conditions prevailed, would have reduced the value of results considerably. Fortunately these are not like the weather, and the experience of this season will prevent them from being present in future.

Though no finality was arrived at, a result of the tests, so far as they were carried, is given:—

Treated Seed.—Black Oats; sown, 6th June; appeared, 16th; germination, 90 per cent.; earing, October, third week.

Control.—Garton's Bountiful Oats; sown, 6th June; appeared, 16th; germination, 95.2 per cent.; earing, November, first week.

Treated Seed.—Manitoba No. 1 hard; sown, 6th June; appeared, 16th; germination, 6.6 per cent.; earing, October, second week.

Control.—Manitoba No. 1 hard; sown, 6th June; appeared, 16th; germination, 96 per cent.; earing, October, second week.

Treated Seed.—Irish Wheat; sown, 6th June; appeared, 16th; germination, 81 per cent.; earing, October, fourth week.

Treated Seed.—Red Essex; sown, 6th June; appeared, 16th; germination, 98 per cent.; earing, October, fourth week.

Control.—Red Fife; sown, 6th June; appeared, 16th; germination, 98 per cent.; earing, October, third week.

The duplicate sowing made on the 5th July, with the exception that a slightly better germination percentage was obtained with the treated Manitoba seed, gave the same results.

The seed received in July furnished grain of two Queensland varieties, and the untreated grain for check purposes was obtained from the manager of the Warwick mill. The seed was sown 1st August, and germinated 12th August. The varieties were Free's Abundance and Indian Pearl; the treated and untreated of both varieties came into ear third week in October.

The varieties received in the first batch were long-season wheats, which kinds, even in a good season, do not mature in the manner they should, being generally ripened off by the hot weather.

The second did contain seeds of two Queensland varieties; but they were received too late in the season—at least for this portion of the State—to be expected to do justice to the treatment.

It is hoped that this season (1912) will be such as to afford every opportunity for carrying out the tests under fair conditions, as both, according to their advocates, produce results which are desired by all and achieved by few.

TIMES OF SUNRISE AND SUNSET AT BRISBANE, 1912.

DATE.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·14	5·16	6·31	5·0	6·40	5·3	6·30	5·18
2	6·14	5·15	6·31	5·0	6·40	5·4	6·30	5·18
3	6·15	5·14	6·32	5·0	6·40	5·4	6·29	5·19
4	6·15	5·13	6·32	5·0	6·40	5·4	6·29	5·20
5	6·16	5·13	6·33	5·0	6·40	5·4	6·28	5·20
6	6·17	5·12	6·33	5·0	6·40	5·5	6·28	5·20
7	6·17	5·12	6·34	5·0	6·40	5·5	6·27	5·21
8	6·18	5·11	6·34	4·59	6·40	5·6	6·26	5·21
9	6·18	5·10	6·35	4·59	6·39	5·6	6·25	5·22
10	6·19	5·10	6·35	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6·23	5·23
12	6·20	5·9	6·35	4·59	6·39	5·7	6·22	5·24
13	6·20	5·8	6·36	4·59	6·39	5·8	6·21	5·25
14	6·21	5·8	6·36	4·59	6·39	5·8	6·20	5·25
15	6·21	5·7	6·36	4·59	6·39	5·9	6·19	5·26
16	6·22	5·7	6 37	4·59	6·38	5·9	6·18	5·26
17	6·22	5·6	6·37	4·59	6·38	5·10	6·17	5·26
18	6·23	5·6	6·38	5·0	6·37	5·11	6·16	5·27
19	6·24	5·5	6·38	5·0	6·37	5·11	6·16	5·27
20	6·24	5·5	6·38	5·0	6·36	5·12	6·15	5·28
21	6·25	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·26	5·4	6·39	5·1	6·36	5·12	6·13	5·28
23	6·26	5·3	6·39	5·1	6·35	5·13	6·12	5·29
24	6·27	5·3	6·39	5·1	6·35	5·13	6·11	5·29
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5·30
26	6·28	5·2	6·39	5·1	6·33	5·15	6·9	5·30
27	6·28	5·1	6·40	5·2	6·33	5·15	6·8	5·30
28	6·29	5·1	6·40	5·2	6·32	5·16	6·7	5·31
29	6·29	5·1	6·40	5·2	6·32	5·16	6·6	5·31
30	6·30	5·0	6·40	5·3	6·31	5·17	6·5	5·32
31	6·30	5·0	...	...	6·31	5·17	6·4	5·32

PHASES OF THE MOON.

			H.	M.	
1 May	○	Full Moon	8	19	p.m.
9 „	☽	Last Quarter	7	56	„
17 „	●	New Moon	8	14	a.m.
24 „	☾	First Quarter	12	11	„
31 „	○	Full Moon	9	30	„
8 June	☽	Last Quarter	12	36	p.m.
15 „	●	New Moon	4	24	„
22 „	☾	First Quarter	6	39	a.m.
29 „	○	Full Moon	11	34	p.m.
8 July	☽	Last Quarter	2	47	a.m.
14 „	●	New Moon	11	13	p.m.
21 „	☾	First Quarter	3	18	„
29 „	○	Full Moon	2	28	„
6 Aug.	☽	Last Quarter	2	18	p.m.
13 „	●	New Moon	5	58	a.m.
20 „	☾	First Quarter	2	57	„
28 „	○	Full Moon	5	59	„

The Orchard.

THE BANANA IN QUEENSLAND.

[CONTINUED FROM JUNE NUMBER.]

APPLICATION OF FERTILISERS.

I have had frequent inquiries, not from large growers in any instance but from farmers and suburban residents, who plant from half-an-acre to a couple of perches of bananas on not too rich soil, as to what fertiliser would give the best results. This is a question which it is practically impossible to answer. It would be necessary to have an analysis of the soils in addition to information concerning the subsoil and the lay of the land, whether hilly or flat. It would manifestly not be advisable to recommend any particular fertiliser to an inquirer who simply states that he is growing Bananas, and that they do not fruit properly. Some necessary constituent of the soil may be abundant, another may be entirely absent; so that any recommendation might entail useless expense on the grower.

When, however, a whole plantation shows signs of exhaustion, it is fairly safe to presume that Bananas have been grown there continuously for many years, and that nitrogen, potash, and phosphoric acid are needed. Without an analysis of the soil, and with the above qualification, I may state, generally, that Bananas require very large amounts of potash, and if this ingredient is absent good yields of heavy bunches cannot be expected. I have already explained that the ash of the Cavendish Banana—that is to say, of the fruit—contains 66 per cent. of potash, and the leaves contain over 27 per cent. On this subject of fertilisers, I cannot do better than present to banana-growers the following résumé of reports of experiments in manuring bananas, carried out (and still in progress, June, 1912) by Mr. A. H. Benson and Mr. J. C. Brünnich, Agricultural Chemist, Department of Agriculture and Stock.

FERTILISERS FOR BANANAS.

In May, 1909, Mr. A. H. Benson, then Instructor in Fruit Culture, a man highly qualified to undertake the duty, was deputed by the Minister for Agriculture to proceed to Buderim Mountain, and select suitable sites on which Bananas were being grown for experimental work in manuring; and I may here say that, although Mr. Benson has since been appointed Director of Agriculture in Tasmania, his work has been and still is being carried on, on scientific principles, by Mr. J. C. Brünnich, Agricultural Chemist, Department of Agriculture and Stock. He found that on the mountain proper a considerable amount of experimental

manuring was being carried out by several of the growers with more or less success. Various commercial fertilisers, in addition to green crops, ploughed in, had been used with more or less beneficial results. He selected two plots of land, both of which were so exhausted that to attempt to grow Bananas on them in their then state would, he said, be to court failure. The soil, therefore, was very suitable for experiment. After consultation with the Agricultural Chemist, Mr. J. C. Brünnich, the composition of a complete manure was decided on, the same to be used as the base of all the experiments.

This manure contained the following plant foods per acre:—

80 lb. Pure Potash K_2O).
80 lb. Phosphoric Acid (P_2O_5).
40 lb. Nitrogen (N).

The Potash was given in the form of Sulphate of Potash; the Phosphoric Acid in the form of Thomas' Phosphate or Superphosphate; and the Nitrogen in the form of Nitrate of Soda, Sulphate of Ammonia, or Dried Blood.

There were two distinct series of experiments—one in which commercial fertilisers only were used, and the other in which commercial fertilisers were used to grow a leguminous crop, to be used as a manure for the Bananas. The manure used to grow these leguminous crops contained the following plant foods per acre:—

40 lb. of (K O).
40 lb. of (P_2O_5).
10 lb. of (N).

The ground having been thoroughly prepared in the manner previously detailed, the planting of Bananas was done in September, 1909; and the whole work was carried on by the growers under the personal supervision of Mr. Benson and Mr. Brünnich.

Space will not admit of minute details of the experiments, which were carefully carried out and full records of progress kept. In June, 1910, Mr. Brünnich furnished a "Progress Report," with photographs of the plants taken in May of that year. They showed that the latter had made splendid growth since January, and this clearly demonstrated what can be accomplished by deep, thorough cultivation even on exhausted lands.

At the above date, the plants were suckering and fruiting well, equally as well as those on a neighbouring plot which had not long been under cultivation.

The next report is dated 17th October, 1910, when the Bananas had been growing for eleven months, and the first bunches were just ripening. The bunches were as large as could be expected for a first crop, even from fair quality new land.

PLATE I.

BANANA MANURING EXPERIMENTS AT BUDERIM MOUNTAINS.

J. FOOTE, ESQ.

Three Months Old. Experiments A to K Cavendish Bananas.

Standard Manure in all Experiments.

K = 80 lb. K_2O = 160 lb. Sulphate of Potash.

P = 80 lb. P_2O_5 = 470 lb. Superphosphate or Thomas Phosphate.

N = 40 b. N as 286 lb. Dried Blood; or 250 lb. Nitrate of Soda; or 200 lb. Ammonium Sulphate.

2 { **K** / **P** / **N** } Means double quantities.

½ { **K** / **P** / **N** } Means half quantities.

{ **K** / **P** / **N** } Pot. sulph. Superphosph. Dr. blood.

Cost per plant: 2¾d.

2 { **K** / **P** / **N** } Pot. Sulph. Superphosph. Dr. blood.

Cost per plant: 5½d.

PLATE I.—*continued.*

K, P, N — Pot. sulph., Superphosph., Ammon. sulph.

Cost per plant: $2\frac{3}{4}$d.

2 × (K, P, N — Pot. sulph., Superphosph., Ammon. sulph.)

Cost per plant: $5\frac{5}{8}$d.

K, P, N — Pot. sulph., Thomas phosph., Ammon. sulph.

Cost per plant: $2\frac{5}{8}$d.

K, P, N — Pot. sulph., Superphosph., Dr. blood.

PLATE I.—*continued.*

{ K / P / N } Pot. sulph. / Thomas phosph. / Nitrate.

Cost per plant: $3\frac{1}{8}$d.

{ K / P / N } Pot. sulph. / Superphosph. / Ammon. sulph.

Cost per plant: $2\frac{3}{4}$d.

2 { K / P / N } Pot. sulph. / Superphosph. / Ammon. sulph.

Cost per plant: $5\frac{5}{8}$d.

{ K / P / N } Pot. sulph. / Thomas phosph. / Ammon. sulph.

Cost per plant: $2\frac{5}{8}$d.

PLATE I.—*continued.*

½ { K P N } Pot sulph. Superphosph. Dr. blood.

Cost per plant : 1⅜d.

NO MANURE.

Nil.

½ { K P N } Pot. sulph. Superphosph. Nitrate.

Cost per plant : 1½d.

2 { K P N } Pot. sulph. Thomas phosph. Nitrate.

Cost per plant : 6¼d.

PLATE II.

{ K / P / N } Pot. sulph. / Superphosph. / Dr. blood.

Cost per plant: $2\frac{3}{4}$d.

BANANA MANURING EXPERIMENTS AT BUDERIM MOUNTAINS.

W. H. GUY, Esq.

Three Months Old.

No. 1 to No. 10, Cavendish.

No. 11, Lady's Finger.

Standard Manure same as on Plate I.

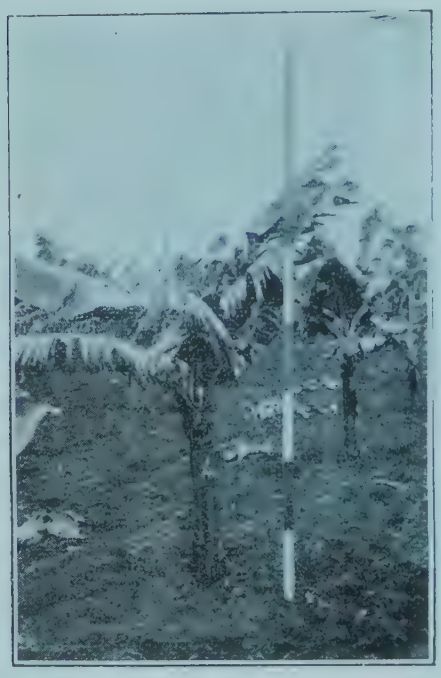
2 { K / P / N } Pot. sulph. / Superphosph. / Dr. blood.

Cost per plant: $5\frac{1}{2}$d.

$\frac{1}{2}$ { K / P / N } Pot. sulph. / Superphosph. / Dr. blood.

Cost per plant: $1\frac{3}{8}$d.

PLATE II.—*continued.*



NO MANURE.

Nil.

½ { K, P, N } Pot. sulph., Superphosph., Nitrate.

Cost per plant: 1½d.

2 { K, P, N } Pot. sulph., Thomas phosph., Nitrate.

Cost per plant: 6¼d.

{ K, P, N } Pot. sulph., Thomas phosph., Nitrate.

Cost per plant: 3⅛d.

PLATE III.

$\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $2\frac{3}{4}$d. per stool.

BANANA MANURING EXPERIMENTS AT BUDERIM MOUNTAINS.

J. FOOTE, ESQ.

Experiments the same as on Plate I.

Stools 7 Months Old.

$2\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $5\frac{1}{2}$d. per stool.

$\frac{1}{2}\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $1\frac{3}{8}$d. per stool.

PLATE III.—*continued.*

UNMANURED.

½ { K P N }

Cost: 1½d. per stool.

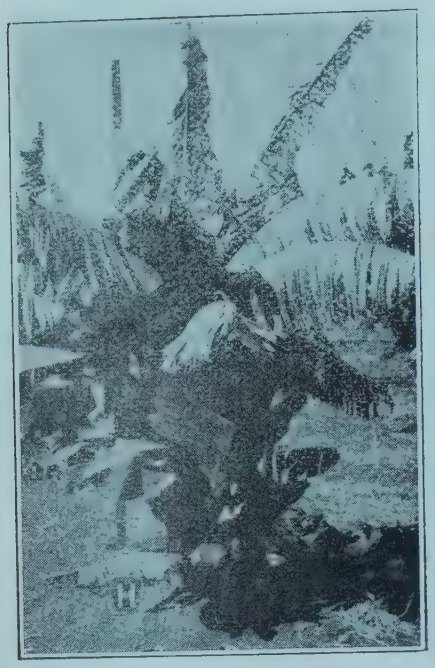
2 { K P N }

Cost: 6¼d. per stool.

{ K P N }

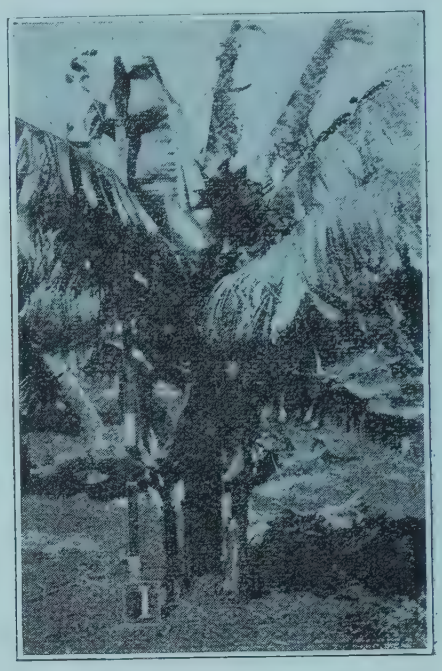
Cost: 3d. per stool.

PLATE III.—*continued.*



$\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $2\frac{3}{4}$d. per stool.



$2\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $5\frac{1}{2}$d. per stool.

$\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $2\frac{1}{2}$d. per stool.

Banana Stool, 7 Months Old, on Virgin Scrub Soil.

UNMANURED.

PLATE IV.

$\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $2\frac{3}{4}$d. per stool.

BANANA MANURING EXPERIMENTS AT BUDERIM MOUNTAINS.

W. H. GUY, Esq.

Experiment 1 to 10, Cavendish.

Same as Plate II.

Stools 7 Months Old

$2\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $5\frac{1}{2}$d. per stool.

$\frac{1}{2}\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $1\frac{3}{8}$d. per stool.

PLATE IV.—*continued.*

$\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $2\frac{3}{4}$d. per stool.

$2\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $5\frac{1}{2}$d. per stool.

$\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $2\frac{1}{2}$d. per stool.

Lady's Finger, 7 Months Old.

$\left\{\begin{matrix}\mathbf{K}\\\mathbf{P}\\\mathbf{N}\end{matrix}\right\}$

Cost: $5\frac{1}{2}$d. per stool.

PLATE IV.—*continued.*

UNMANURED.

$\frac{1}{2}$ { K P N }

Cost: 1½d. per stool.

2 { K P N }

Cost: 6¼d. per stool.

{ K P N }

Cost: 3d. per stool.

The cost of the experiments per stool for fertiliser was from 1⅜d. to 6¼d., according to the manure used.

The fourth Progress Report dealt with the first harvest of fruit, which proved eminently satisfactory. The total cost of five dressings of manure amounted to about 1s. 6d. per stool, the first crop yielding, on an average of ten experiments, 92 Bananas per stool or nearly 8 dozen fruits per bunch. The actual results of the experiments were as follows:—

		Plot 1 (Foote's).					Plot 2 (Guy's).			
No. of Experiment.	Manures Applied.	Total Cost of Manure in pence per Stool.	Number of Bananas per Stool.	Dozens of Bananas per Bunch.	Number of First Bunches in Experimental Blocks.	Number of New Suckers for next Crop.	Number of Bananas.	Dozens per Bunch.	Number of First Bunches.	Number of New Suckers for next Crop.
1	KPN ... (Blood) ...	6¼	96	9	32	73	18	6	7	55
2	2 (KPN) ...	12½	120	10	36	83	19	6½	7	66
3	½ (KPN) ...	3⅛	76	8½	27	70 (poor)	11	4	6	47
4	Nil	...	49	5½	27	48 (v. poor)	15	6	6	44
5	½ (KPN) ...	3½	88	8	33	57 (poor)	55	7	17	56
6	2 (KPN) ...	14	101	8½	33	75	86	7¾	26	57
7	(KPN) ... (Nitrate.) ...	7⅛	94	8½	34	72	55	6½	20	54
8	(KPN)	6¼	104	9¼	33	71	29	5¾	12	61
9	2 (KPN) ...	12⅞	106	9½	34	70	67	7½	21	53
10	KPN ... (Ammon.) ...	5⅞	94	8¼	34	66	47	6½	17	44
		Number of Stools for each Experiment, 36.					Number of Stools for each Experiment, 26.			

NOTE.—K = 160 lb. K_2O = 320 lb. Sulphate of Potash.
P = 80 lb. P_2O_5 = 470 lb. Superphosphate or Thomas' Phosphate.
N = 40 lb. N as 286 lb. dried blood, or 250 lb. Nitrate of Soda or 200 lb. Ammonium Sulphate.
2 (KPN) means double quantities. ½ (KPN) means half quantities.

Analyses of Banana Plants and Fruits Grown on Buderim Mountain.

—	Banana Plants: Ash.						Banana Fruits: Ash.					
	Lady's Finger.		Cavendish.		Sugar.		Lady's Finger.		Cavendish.		Sugar.	
	—	Pure Ash.	—	Pure Ash.	—	Pure Ash.	—	Pure Ash.	—	Pure Ash.	—	Pure Ash.
		%		%		%		%		%		%
Weight of green plant	118 lb.	...	52 lb.	...	62 lb.	...	...	...	...	...	...	...
Weight of bunch	...	...	...	...	...	...	22 lb.	...	39 lb.	...	16 lb.	...
Approximate number of bunches per acre	...	...	...	...	...	...	432	...	555	...	460	...
Moisture ... per cent.	87·69	...	90·00	...	85·54	...	75·9	...	79·8	...	72·75	...
Dry Material ... per cent.	12·31	...	10·00	...	14·46	...	24·1	...	20·2	...	27·25	...
Pure Ash ... per cent.	1·14	...	1·31	...	1·14	...	1·18	...	·94	...	·92	...
Containing—												
Silica SiO_2	·270	23·68	·201	15·34	·245	21·49	·082	6·960	·059	6·225	·063	6·923
Iron and Alumina, $Fe_2O_3Al_2O_3$	·015	1·32	·023	1·77	·021	1·88	·033	2·835	·010	1·112	·037	4·061
Manganese Oxide, MnO	·026	2·32	·023	1·77	·021	1·88	·001	·119	·002	·200	·001	·115
Lime, CaO	·219	19·24	·278	21·33	·151	13·25	·039	3·324	·020	2·125	·018	2·016
Magnesia, MgO	·064	5·66	·092	7·02	·100	8·77	·071	5·995	·056	5·925	·056	6·091
Soda, Na_2O	·050	4·44	·021	1·60	·022	2·00	·033	2·815	·018	1·880	·023	2·506
Potash, K_2O	·378	33·17	·480	36·64	·437	38·83	·734	62·350	·605	64·250	·555	60·625
Sulphuric Acid, SO_3	·007	·66	·018	1·38	·020	1·75	·017	1·445	·013	1·329	·015	1·659
Phosphoric Acid, P_2O_5	·030	2·65	·019	1·46	·040	3·52	·083	7·010	·058	6·150	·071	7·748
Chlorine, Cl	·121	10·62	·199	15·20	·103	9·10	·108	9·175	·130	13·900	·098	10·728
Nitrogen, N	·107	...	·133	...	·136	...	·212	...	·202	...	·304	...

	Lb. of Plant Food.						Lb. of Plant Food.					
	In each Plant.	In Plants per Acre.	In each Plant.	In Plants per Acre.	In each Plant.	In Plants per Acre.	In each Bunch.	In Bunches per Acre.	In each Bunch.	In Bunches per Acre.	In each Bunch.	In Bunches per Acre.
Lime, CaO	·258	154·8	·144	86·4	·093	55·8	·0086	3·73	·0079	4·37	·0029	1·36
Magnesia, MgO	·075	45·0	·048	28·8	·062	37·2	·0155	6·70	·0217	12·03	·0089	4·10
Potash, K_2O	·446	267·6	·250	150·0	·272	163·2	·1615	69·75	·2360	123·09	·0888	40·80
Phosphoric Acid, P_2O_5	·035	21·0	·010	6·0	·025	15·0	·0182	7·84	·0226	12·50	·0113	5·21
Nitrogen, N	·126	75·6	·069	41·4	·084	50·4	·0466	20·15	·0787	43·70	·0486	22·38

BANANAS AND BEES.

In a series of articles on the Banana Industry, published in "The Journal of the Board of Agriculture of British Guiana" in 1909, Mr. Stockdale (the author) mentioned, in dealing with the "Diseases of the Banana," that bees, in Surinam (Dutch Guiana) have been responsible on some estates for a very great amount of damage. At Meerzorg 12,000 to 15,000 bunches, or over 20 bunches per acre, were actually lost in 1908 by "spotting" by bees; while all the labourers had to be employed in destroying bees rather than in cultivating Bananas, so that the extent of damage was not limited to those 12,000 to 15,000 bunches. Occasionally still larger losses have been suffered through Bananas being blown down by winds, especially in exposed situations.

These various causes of loss were reported on by a Commission appointed by the Government of British Guiana to investigate the industry as carried on there, and the Committee came to the conclusion that, for these and trade reasons, no hope of or any inducement offered for the establishment of a Banana Industry in British Guiana either then or in the near future.

I have made many inquiries amongst banana-growers in Queensland as to whether bees, which are so numerous everywhere in the State, had ever been a cause of damage to Bananas, but cannot find that those busy insects have been responsible for damage to the fruit, I grew Bananas for several years here, and also kept numbers of bees, wild brown bees being very numerous also in the neighbourhood, but I never noticed that they troubled the Bananas. Why they should, in Surinam, attack the acrid skin of the Banana, or what they expected to carry thence to their hives, has not been explained to my knowledge.

A NEW STUMP-JUMP PLOUGH.

A trial was lately given at Kamarah (N.S.W.), of Mr. Clarence H. Smith's stump-jump single-jump one-way disc cultivator (says the "Farmer and Settler"). The ground was new and full of stumps, yet it turned the earth over equal to being ploughed. Six horses were used to eleven discs, and a long test was made, going for about three hours.

This is a new implement, and from telegrams received from South Australia great satisfaction is being given by it there as well as here. The jump is quite distinct from other makes, the disc going sideways, and therefore gliding over the stump; this, the maker maintains, is easier on the discs and they last longer. The springs, being for each disc, act on each separately and, directly the disc is over the stump, force it into the ground.

[Such a plough, as above described, if it does the work claimed for it, should be a valuable implement for new settlers in Queensland; and it will doubtless be introduced into this State in due course, in which case, a public demonstration would soon decide its merits.—Ed. "Q.A.J."]

Viticulture.

OBSERVATIONS AND CULTURAL NOTES ON GRAPES.—No. 7.

BY CHARLES ROSS, Instructor in Fruit Culture.

[CONTINUED.]

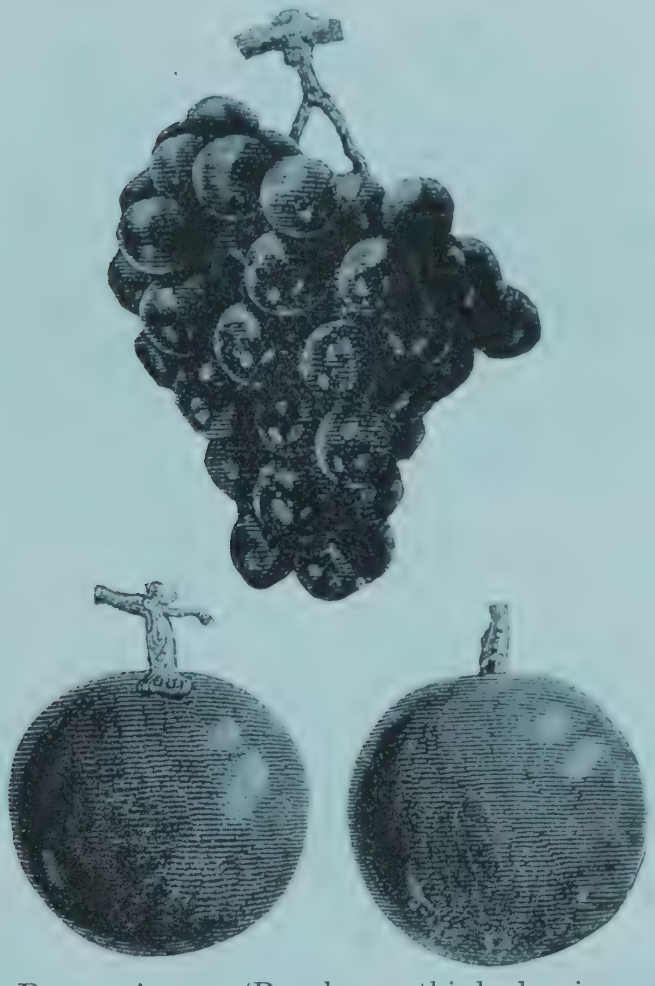


PLATE 2.—ROYAL ASCOT—(Bunch, one-third; berries natural size.)

33. *Waltham Cross.*—A large, oval, vinous grape. The bunches are large, beautifully tapering, with very long stalks; and the fruit sets well and evenly. Very large berries with thick skin of greenish yellow colour, changing to deeper amber when thoroughly ripe. The flesh is very firm, sweet, and crackling, but not rich. A most handsome and useful late-keeping variety. The vine is a rampant grower, but the wood does not ripen very well, often dying back in wet seasons, and is liable to spot in coastal districts. The variety is an English seedling, but is best suited to a dry, warm ridge of fairly rich, sandy or gritty loam well drained.

34. *Wortly Hall.*—A large, black, oval grape. Very large bunches heavily shouldered and closely set. The berries grow very large when properly thinned, tough skin, deep purple, carrying a heavy bloom. A good late variety, and may be marketed as soon as it is coloured; but

the flavour is rather coarse before it fully ripens, and it should be left to hang longer to bring out its true merits. The vine is strong, vigorous, hardy, prolific, and not susceptible to disease. It was raised in England, and will stand rougher treatment than most first-class table varieties.

PLATE 3.—TREBBIANO.—(Bunch, one-third; berries, natural size.

35. *Dattier de Beyrout.*—A very fine, oval, amber-coloured grape. The bunches are above average size, well set, and exceedingly handsome. Very large berries, oblong, greenish yellow, semi-transparent skin turning to rich deep amber when ripe. The juice is sweet and crackling. A late kind, hanging well into the autumn. The vine is a moderate grower, robust and healthy, but not a heavy bearer. It does best on fairly good,

well-drained soil; but it would do better inland than near the coast. It is well worthy a place in any collection for its appearance alone, as its great beauty is never excelled by any other white variety. Its name indicates a Levantine origin, whence so many striking varieties have been introduced.

PLATE 4.—GŒTHE (ROGERS' HYBRID NO. 4).

36. *Muscat of Alexandria.*—This variety has been grown under so many synonyms that one is easily confused. The well-known and largely grown "Gordo Blanco" is so very similar in all its characteristics that the difference is almost imperceptible, although it is claimed by some growers that it is more reliable in setting its berries. This has not been my experience, and I cannot vouch for it. It is commonly noticed that both close and thinly set bunches grow on the same vine. A late, oval,

white Muscat grape of first-class merit, undoubtedly the most valuable variety in cultivation. The bunches are large and tapering, but set in a very erratic manner. Very large berries, with thick greenish-yellow skin turning to rich amber, tinted with a rosy hue on the sunny side and very handsome. Its sweet, rich, crackling flesh possesses the highest Muscat flavour. The vine is vigorous and robust, often rampant on rich soil before it comes into full bearing. The bunches appear in great profusion, and, if all are left on, growth on the early summer shoots is

PLATE 5.—ELVIRA.

often retarded. This may also have the effect of the berries setting unevenly. Close winter pruning is required and topping the extra vigorous summer shoots only. One of the oldest and best of grapes. Its place of origin seems lost in obscurity. It probably was introduced from somewhere in the Levantine region in early times, and since brought to its present perfection. More suitable for inland districts, although it has been grown with moderate success near Brisbane. Specially deserves and will well repay high-class treatment.

PLATE 6.—WILDER (ROGERS' HYBRID NO. 1).

Tropical Industries.

SOME OF OUR RUBBER PLANTATIONS.

By HOWARD NEWPORT, Instructor in Tropical Agriculture.

The fact that our one tropical industry in this country that has attained any dimensions (sugar) is, from its very nature, one that requires that the plantations or farms shall be grouped (round a mill) in any given district—and which, therefore, can be readily seen in appreciable area—is very apt to induce the idea that no other industries exist since they cannot be similarly viewed.

Other tropical industries, do, however, exist, though it is true they have not attained the proportions of sugar culture as yet; but there is no reason at all why, with more or less similar treatment and attention, these should not ultimately attain similar proportions, if not in area, at least in results—that is, in the production of commodities to the approximate limit of the demand or consumption of the country.

Sugar being a bulky product, which is produced in more or less quantity in the marketable form in, of necessity, distinct centres, intercommunication between the farms, as well as between each centre and the seaport, is by rail. Hence they are easily accessible, and a considerable area may be viewed in a comparatively short time by means of the light line locomotive, on horseback, or even on foot, which, while helping the sugar industry, tends to an underrating or undervaluing by comparison of what does exist in the way of tropical agricultural industries other than sugar.

With such industries as Rubber, Coffee, Vanilla, Cocoanuts, &c. (of which plantations are by no means non-existent), not only is the area for a given return frequently less than sugar, but, a central factory for rendering the raw articles marketable not being necessary, the estates are not grouped; and it is not possible, therefore, to visit a district and in a few hours at most circumvent the whole area under the one staple in the locality. In short, the sugar industry tends to a sort of local centralisation, while most other tropical industries lead to decentralisation. Were all the Rubber, Coffee, and other such estates grouped, no doubt the locality would be more visited and consequently that industry or staple better advertised.

Again, the products of Rubber, Coffee, Copra, and Vanilla, as well as being generally less perishable, are so valuable per bulk (Rubber, about £520 per ton; Coffee, £70 to £100 per ton; Copra, £24 per ton; and Vanilla Beans up to 20s. per lb.) that they are able the better to overcome difficulties in the way of more costly methods of transport. Hence they may be and are grown in the more outlying and, therefore,

more isolated localities. Considered rightly, these points stand to their credit since they tend to induce settlement in the more unoccupied areas; but by their very virtues do they suffer, for combination among producers is almost impossible of attainment, and a group of rubber or coffee growers can practically never be met with, either to be addressed or to attract the attention of visitors and newcomers; and, therefore, the encouragement of publicity, attention, and advertisement, as well as the attraction to others to engage in similar interesting as well as remunerative occupations, is lacking. It is their lot to be virtually ignored—because seldom seen and little heard of.

As from their nature these isolated estates cannot be brought before the public, the authorities, or the newcomers, the industries suffer by the relative importance not being brought home to one of the part they are really playing in the whole settlement of the tropical areas during their infancy and inauguration.

"To him that hath shall be given" is an old saying; and no doubt the more the small industries grow the more attention they will attract, and the more they will be encouraged and enabled to grow. Meanwhile it is but to be expected that progress will be slow. As soon as there are enough growers in any one locality to invite members of the Government and the public generally, as well as the intending or prospective settlers, to inspect and view their efforts and successes, to address them and be entertained by them, so soon will the strides of progress become longer and faster.

Each new settler, therefore, who takes up, whether wholly or in part, any of these staples should be of special interest to all other growers as being at this stage a by no means negligible factor in their own stability and progress. As such he is worthy of their encouragement, advice, and assistance, and his success, if it be possible, should be welcomed. Generally, growers of the same staple are only too pleased to exchange ideas on matters of such mutual concern and interest, and to "talk shop" whenever they meet; but, to again compare the growing of these products with the growing of sugar, the information a new grower of sugar-cane can obtain by walking into the next paddock, the rubber or coffee grower may have to spend much time and travel far to obtain. Similarly, therefore, as the various tropical industries other than sugar suffer collectively by want of public attention to them through their being individually separated or isolated, so also do the growers themselves suffer by being unable to discuss points of culture and compare results and exchange ideas between themselves. Hence it is thought that the little collection of snap-shots, taken during the past few months, of some of our Northern Queensland Rubber Plantations, young and small though they may be, will prove of interest not only to those who did not, perhaps, know that such existed, or those who may be watching with intent and interest the first efforts of this industry, but also to the growers themselves for purposes of comparison, &c., and also, it is hoped, may help to expedite the time when greater strides and quicker progress may be looked for.

That Pará Rubber will thrive in Queensland has long ere this been amply demonstrated. Indeed, the growth of the trees has proved quite equal, on the average, to any other country where it is being cultivated. Also, the value of Bananas as a catch crop for Rubber—or Rubber as an ultimate crop for land under Bananas, whichever way it may be taken—has been amply and successfully demonstrated. According to the usual method of Banana cultivation in North Queensland, the suckers are planted out about 12 ft. by 12 ft. in soil and in situations that are just what the Pará Rubber requires. The Bananas commence bearing in eight to twelve months, and continue for five or six years, by which time the stools require replanting, when advantage is often taken of the opportunity to open new land, and the old field is abandoned.

Meanwhile, if Rubber has been planted, the shade and cultivation afforded by and to the Bananas is all that the young Rubber plants need; and by the time the Bananas are considered worked out their place is automatically taken by the Rubber, which is by then just about ready to tap. Instead, therefore, of a useless field, that would soon become a nursery of undergrowth and noxious weeds, there stands a valuable plantation at a minimum of expenditure; while the otherwise irksome period of waiting for returns has been overcome by means of the Banana crops, and has been hardly felt, if felt at all.

The areas in these Queensland plantations may strike anyone accustomed to eastern tropical plantations as being small, but it must be borne in mind that these are what may be called "one-man" plantations where the owner has generally to do all the work; also, that, where the trees will produce 12s. to 15s. worth of rubber a year, the return from even an acre is appreciable.

Fig. 1 is a plantation near Cairns—to be precise, at Hambledon Junction—a small area of about 1½ acres planted by Mrs. Dr. Koch, of Cairns. The trees were about fifteen months old when photographed, which was at the very driest time of a dry season, the earlier part of which included two cyclonic blows and a flood. The bananas had suffered severely, but the rubber-trees not merely survived, but were growing and forming new leaf at the time, indicating that they had rooted deeply and well. In fact, this little plantation, which can be seen by travellers on the Cairns-Mulgrave Tramway, recently taken over by the Government, is an excellent object lesson of the hardiness of the *Hevea braziliensis* in our soils and climate.

No. 2 is a plantation of some 5 or 6 acres on the Little Mulgrave River, near Nelson. The photo. is taken from some distance to include one or two year-old trees.

No. 3 is another very fine little plantation at Clyde, near Babinda, and opened by Mr. W. J. Hanneysee. At present some 6 acres are planted about 15 ft. apart, and no catch crops are underweigh, though some are contemplated. A few two-year-old trees exist, which have grown well, though some are bent owing to the recent cyclone. Against one of these the proprietor is standing.

There is often ample space for many such permanent economic staples on ordinary farms in headlands, spare spaces, gullies, and odd corners.

Fig. 4 shows some trees doing very well on a sugar farm at Palma, on the same line, several hundreds of which have been planted round the headlands. These suffered last year to some extent, when small, from the smoke and heat of burning trash, but were not materially damaged, and, from now on, should suffer very little even from this ordeal.

No. 5 is a plantation on the Murray River, the port for which is Cardwell. Here the trees, which are four and a-half years old, may be seen replacing the bananas among which they were planted. This estate consists of some 2,000 trees or more of various ages.

No. 6 depicts another portion of the same plantation with a specimen of an eighteen-month Pará tree among young bananas.

No. 10 is one of the trees from the field shown in No. 5 wherein the size of the tree may be judged, and which, it must be admitted, is very satisfactory for its age. The estate is being enthusiastically worked by the planter, Mr. Brice Henry.

Nearer Cardwell is another plantation which, if smaller, is, if possible, even more satisfactory. Mr. P. T. Hogg has here planted his rubber and bananas (largely Gros Michel) together. A few hundred trees are two years old, and are sturdy and healthy, as shown in Figs. 8 and 9; but the younger clearings appearing in Fig. 7 show fine young trees 2 in. or more in diameter and 12 ft. high at an age of eleven months only, which will be found to compare well with similar aged trees in any country.

Figs. 11 and 12 are from an estate of some 3,000 trees on the South Johnstone River, near Innisfail. These were planted some four and a-half years ago, but, unfortunately, the bananas were then two years old, so that while the cultivation of the bananas is being now given up the rubber-trees are not yet quite big enough to tap. Still, the way in which the rubber is replacing the bananas is clearly shown in Fig. 11. The trolley lines are of wood, and were for the transport of the bananas. The growth of the trees is somewhat uneven in this plantation, but many are of good size, as may be judged by Fig. 12, and some returns are anticipated next year.

It is hoped that another series of similar snap-shots will be available shortly.

[The above most interesting paper on the incipient rubber plantations of North Queensland contains information totally new to the general public, and should do good service in drawing attention to the suitability of the Northern Coast Lands for Rubber-growing, and to the comparative ease with which plantations can be formed, whilst at the same time the planter is enjoying the revenue from other crops whose place will eventually be taken by the rubber trees. Mr. Newport, by his paper, has done more, we consider, to excite interest in and increase the

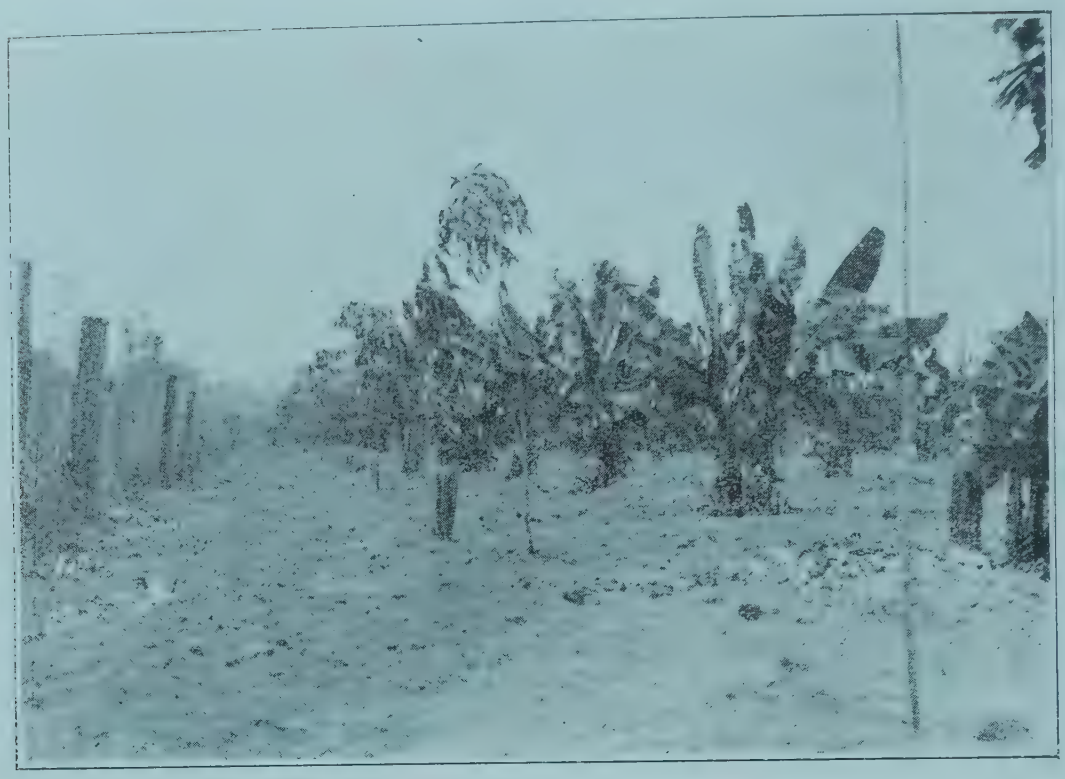


Fig. 1.

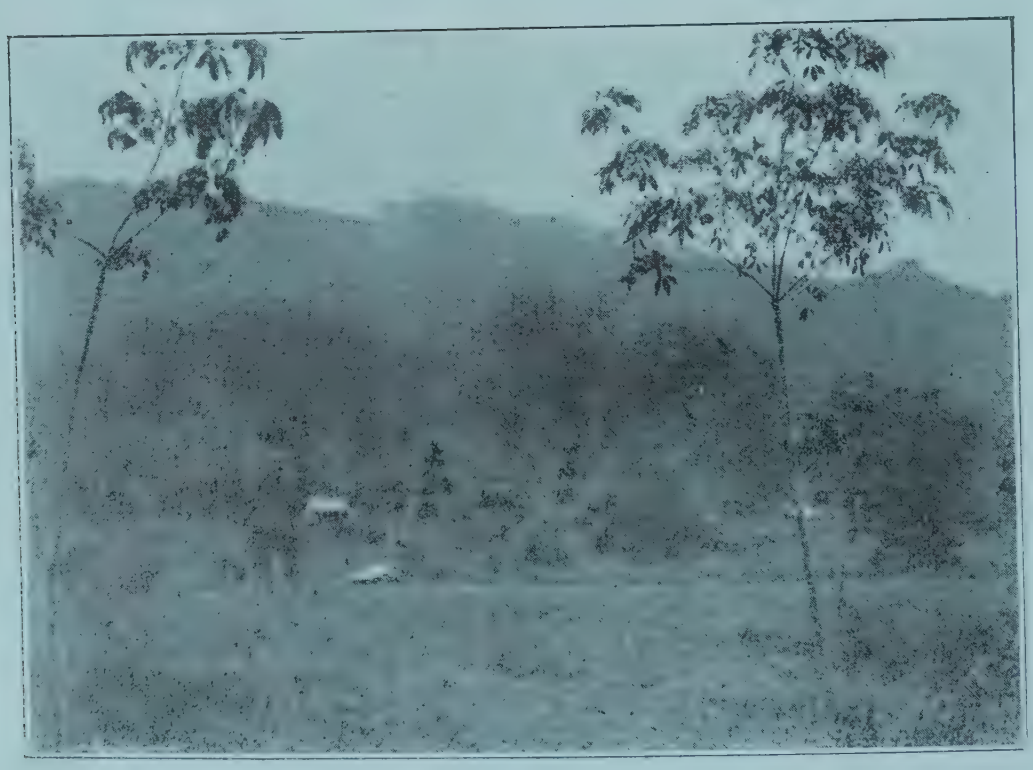


Fig. 2.

PLATE 7.—SOME OF OUR RUBBER PLANTATIONS.
(*See Letterpress.*)

Fig. 3.

Fig. 4.

PLATE 8.—SOME OF OUR RUBBER PLANTATIONS.
(*See Letterpress.*)

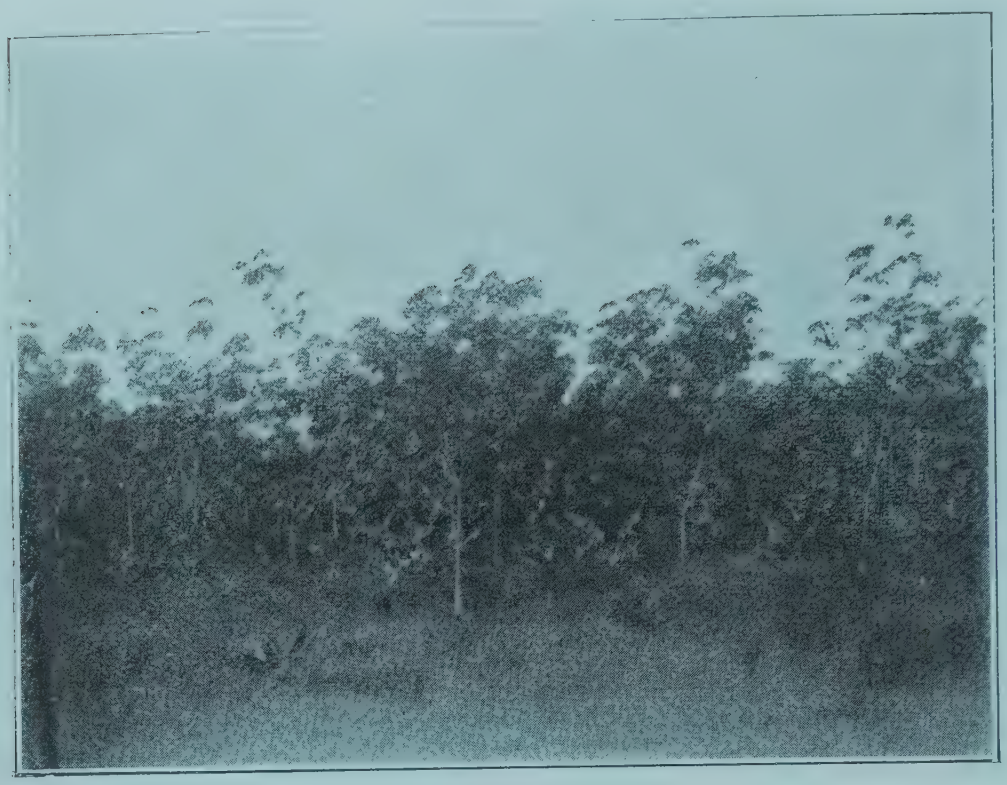


Fig. 5.

Fig. 6.

PLATE 9.—SOME OF OUR RUBBER PLANTATIONS.
(*See Letterpress.*)

Fig. 7.

Fig. 8.

PLATE 10.—SOME OF OUR RUBBER PLANTATIONS.
(*See Letterpress.*)

Fig. 9.

Fig. 10.

PLATE 11.—SOME OF OUR RUBBER PLANTATIONS.
(*See Letterpress.*)

Fig. 11.

Fig 12.

PLATE 12.—SOME OF OUR RUBBER PLANTATIONS.
(*See Letterpress.*)

area under rubber than could have been attained by any long scientific publication on the subject, such papers as the latter only appealing to big companies, and, unlike the above, conveying little of interest to the small farmer. We advise all who are engaged in banana cultivation in North Queensland to carefully read and act upon the information and advice given in Mr. Newport's paper. Last month we paid a visit to the Kamerunga State Nursery, and were shown some 300 well-grown young Pará rubber trees planted between the bananas. These are all fine healthy trees, which give promise of becoming a valuable asset in due course.—Ed. "Q.A.J."]

RUBBER VARIETIES.

We take the following notes on some varieties of rubber trees from a pamphlet on rubber-planting lately published in Sydney by Mr. T. Binnie, of Papua, who has had a large experience of rubber-planting in Ceylon and other rubber-producing countries. After treating of the methods of sowing the seed, forming the nursery, transplanting, &c., he proceeds:—

As in a country with such varied conditions of climate and soil as Papua, while one variety of rubber may suit certain districts, in others most likely it would be an utter failure, and while in the east comparatively little is known about rubber cultivation and the results to be obtained from such cultivation, in Papua we may say there is nothing known on these points.

Of course in an article of this sort it will be impossible to go into all varieties, so I will confine myself to the best known, and those of which I have had personal experience:—

PARA (*HEVEA BRAZILIENSIS*).

This rubber I take first as, owing to the care taken in the collecting, preparation, and placing on the market, it has been made a standard of the market, and all rubbers are graded according to this standard.

Of the genus Hevea there are said to be fourteen lactiforous species, the most valuable being *H. Braziliensis*. This genus has its headquarters in Brazil, but extends to the adjoining territories of Bolivia, Peru, Venezuela, and Guiana. It is the most abundant and best-known of all rubber-yielding plants.

Pará does best where the temperature does not go below 65 degrees, and the rainfall is from 70 in. to 150 in. per annum, and the wind should seldom exceed a velocity of 20 miles an hour, and it should not be planted at a greater altitude than 200 ft.

Flat, low land was originally preferred for rubber plantations, but rubber does equally well in rolling or hilly country. My experience is that, while in the alluvial soils along the banks of rivers, even below flood level, which I believe are the conditions of the Amazon Valley, Pará will do well, better results are obtained on the ridges, provided the soil is good and rainfall adequate.

Sandy soil is unsuitable, while rocky soil is generally favourable.

I have seen "alalang" land successfully planted with Pará, but the land was well ploughed and harrowed first. Lalang soils are usually inferior from a chemical and physical standpoint, though in most cases the growth of the rubber trees appeared to be satisfactory. Such soils usually show a small percentage of organic matter, potash, phosphoric acid, and lime; but ploughing in of green nitrogenous manures and the addition of lime will soon alter this, and perhaps make the land equal to good scrub land. The young trees are planted in rows, but the distance between the trees and between the rows varies a great deal on different plantations. There is a difference of opinion on this point, but it is generally considered that planting closer than 200 trees per acre is a failure.

A great deal of planting at the present time is in avenues.

In Ceylon most planting now being done is in avenues 20 ft. wide, the trees being 15 ft. apart. They are planted so that the avenues run east and west. This gives the sun a chance to shine on the soil. In Malaya most planting is now being done 12 by 24, or 148 to the acre. Some planting is being done 15 by 30, or 96 per acre. One plantation I saw was planting in equilateral triangles, the trees being 17½ ft. apart, or 160 per acre, as against planting in rectangles 17½ by 17½, which would only give 140 per acre.

Pará grows in two forms, one more bushy than the other. Most planters prefer a tree fairly branched. In most places, in order to make the tree branch at a desired height, thumb-nail pruning is resorted to. This also has a tendency to make the tree large at the base. If a tree branches at 10 ft. or 15 ft. from the ground it is about right. Many planters who have "topped" their trees state, however, that it results in two large branches forming, which is apt to split the trunk where the branches meet if the wind is strong. The more leaf, however, a tree has, the better and the quicker will the bark "respond."

The question of how close or how far apart the trees should be planted is one that has had a great deal of attention, and is of vital importance, and it is necessary to consider conditions as they are likely to exist in the future.

Pará, having a thicker bark than Ceara, is much easier to tap; it gives a good flow of latex, which is easily cured by smoke; the seeds, however, are very difficult to germinate, and it does not grow easily from cuttings, and must have good land and a regular rainfall.

CEARA RUBBER (*MANIHOT GLAZIOVII*).

This species was obtained from the province of Ceara by Mr. Cross, and distributed to the West Indies, India, Ceylon, Africa, and the Straits, about the year 1877.

Most of the remarks in reference to Pará apply also to Ceara, with some important exceptions; and it should not be forgotten that this rubber, when well prepared, obtains the highest price.

It grows best in dry tropical countries, on the poorest soils, and if it can be successfully cultivated it will have to be reckoned with as a rubber of the finest grade.

Formerly Ceara rubber appeared on the market in the form of "scrap," being coagulated on the trees by natural heat in tears or strips, and subsequently collected and rolled into balls. In this scrappy and impure condition its value naturally depreciated, but the rubber now prepared in India, Ceylon, and German East Africa is valued at about the same as the best plantation Pará.

I have seen Ceara trees growing at an altitude of 3,000 ft. above the level of the sea. Ceara can be planted where the temperature goes as low as 45 degrees, but a temperature above 50 degrees is preferred. As to rainfall, Ceara does best where there is 50 in. to 120 in. of rain per annum. The best Ceara I have seen was in a district where the rainfall is only 60 in. per annum. The trees will grow in rainier districts, however; but tapping is not so successful as in drier districts.

The Ceara rubber tree is a great drought-resister, and will grow on almost any kind of soil. In Brazil, where the trees were first found, and in the dry province of Ceara, Ceara trees are said to flourish on a sandy and rocky soil, with very little rain. This, however, does not mean that the tree will not thrive on a rich soil with plenty of rain. From experiments made by myself in the Philippines, I am satisfied that on a rich soil with plenty of rain, the trees will grow to be from 8 in. to 12 in. in diameter in three years, and will produce a large amount of rubber of excellent quality. It is generally claimed that a well-drained soil is essential to the welfare of Ceara rubber. I do not believe it will grow in swamps, but I do know that it will get along nicely on perfectly flat land with very poor drainage. I had on the plantation I was managing in the Philippines a number of two-year-old trees which I planted on well-ploughed land on which hemp was planted at the same time. One end of this plot of land had a very poor drainage; the water in the rainy season would stand there at times from two weeks to a month, and the soil was so loose that it would not stand walking on without sinking down to the ankle. The hemp on this piece of land never did thrive well, and most of it died out altogether. I also planted a few Pará seedlings on this land, and, although they are growing, they were nothing in comparison to the others I planted on higher and well-drained ground; but the Ceara rubber trees were flourishing, and did not seem to mind having wet feet for a month at a time—in fact, some of these trees were larger and better shaped than the parent trees from which I selected the seeds.

The following extract from the "Queensland Agricultural Journal" fully bears me out in my advocacy for a fair trial for Ceara rubber:—

"The latest information on this class of rubber is given in a letter to the 'Rubber World,' by Mr. J. S. Low, who is practically experienced in its cultivation and production. He says:—

"'From practical experience with *Manihot Glaziovii* trees in German East Africa, where it is known that the plantations are the largest

and best in East Africa, this being proved by the great number of planters from British East Africa visiting German territory to see and learn how the trees are planted and treated, I am able to state that in East Africa and elsewhere the trees are indestructible within, of course, reasonable limits, assuming, that is, moderate and careful tapping, and keeping the bark clean, &c.

"On experimental tappings of trees ranging from two to three years, and of girths from 11 in. to 18 in., the following results were obtained from the first tappings:—

2 Trees of two and a-half years, 12 in. and 13 in. girth, gave 4 grams wet rubber.

1 Tree of two and a-half years, 14 in. girth, gave 12 grams wet rubber.

2 Trees of two and a-half years, 15 in. and 17 in. girth, gave 24 grams wet rubber.

3 Trees of two and a-half years, 11 in., 15 in., 18 in. girth, gave 31 grams wet rubber.

Total, 71 grams wet rubber.

Note.—28 grams to 1 oz.

Or an average of nearly 9 grams per tree wet rubber."

The first tapping of ninety-one larger trees of two and a-half to three years old gave 3 lb. wet rubber, or nearly ½ oz. per tree. In another instance seventy-five trees, also from the first tapping, gave 2 lb. ½ oz., or somewhat under ½ oz. per tree wet rubber, and this in a district where the rainfall is only 56 in. in the year, and where in the dry season most of the leaves were off the trees.

These trees can be tapped at the very least two or three times per week without in any way injuring them, so long as reasonable care is taken, and they are known to give more latex at the second and subsequent tappings. In a district where the rainfall is greater, nearly double the amount of latex would be obtained. From these dry-weather experiments it will be seen that the lowest possible average from one well-grown tree just ready for tapping is fully 10 grams wet rubber per tree, and at the lowest rate of tapping—*i.e.*, twice a week—this works out at 1,040 grams, or about 37 oz. of wet rubber per tree per annum, which after deducting 30 per cent. for moisture, leaves 26 oz. of dry rubber per tree.

In the old plantations a great number of the trees are from nine to thirteen years old, and still producing latex in large quantities. Ceara trees (*Manihot Glaziovii* and *M. Dichotoma*) yield, for their size and age, far more latex in proportion than the Pará (Hevea) trees. As an example of the wonderful hardiness of these, it may be mentioned that trees are to be met with that have been damaged by being broken off from the ravages of white ants and other causes to within 2 ft. or 3 ft. of the ground, putting out a new shoot from the side of the stump and forming an entirely new tree. In cases of this sort, of course, the actual roots have not been damaged.

Ceara rubber, or Manicoba, known as *Manihot Glaziovii,* belongs to the Spurge order, and is a very close relation to the Cassava plant, from which tapioca is made, and thrives best in deep, loamy soil. These notes are given with a view of contradicting reports that have been spread to the effect that the life and hardiness were not all that could be desired.

In a Brazilian report I read: "*Manihot Glaziovii* produces a rubber more pure even than Pará. There are plantations in the State of Bahia, where 676 trees per acre are dealt with and return 1,490 lb. of rubber per annum. This is, of course, in their native soil and climate, and where the country is at times flooded for months at a time. Instead of injuring the trees, the floods add considerably to their growth and yield of latex."

At the beginning of this century the export of rubber from the State of Bahia had increased more than tenfold within six years, having risen from 100 tons of very inferior rubber in 1900 to over 1,100 tons of a very superior grade of rubber in 1906. This lead to an investigation of the source of this new supply and the discovery that, instead of the low grade of Mangebeira, formerly gathered, the supply came mainly from three new and valuable varieties:—

1. *Manihot dichotoma,* or Jiquie Manicoba;
2. *Manihot heptaphylla,* or San Francisco Manicoba;
3. *Manihot Piauhyensis,* or Piauhy Manicoba.

All of these species, from all accounts, not only yield considerably more latex than Ceara, but, what is of much more importance to Papua, the amount which one man can collect is much greater; in other words, the cost of collection is considerably less.

A notable fact in this connection—one which will appeal to any one who has had any experience in the tapping of Ceara—is that in these new varieties, in shedding the bark, longitudinal slits are formed and the membranous bark peels off in more or less vertical rows. This allows its removal much more easily and therefore more cheaply than is the case with Ceara.

These varieties of Manihot, like the Ceara, have a very dry habitat.

In regard to these three varieties:—

(1) *MANIHOT DICHOTOMA.*

The seeds of this variety are very much larger than those of the Ceara. Germination takes place in two or three weeks if unfilled, the shell being much softer than in the case of Ceara. The soil upon which this tree flourishes is variously described as red clay and red loam. The bark of this tree is thinner and more delicate than that of the Ceara.

(2) AND (3) *MANIHOT HEPTAPHYLLA* AND *MANIHOT PIAUHYENSIS.*

The seeds of these two varieties can hardly be distinguished from each other; they are only a little larger than the Ceara seeds. They do not germinate nearly as well as in the case of the *Manihot dichotoma.*

These two varieties in the region round Bahia thrive in a sandy soil, growing largely on sandstone mountains. Neither of these varieties grow as tall as the *Manihot dichotoma*; they are also smaller and inclined to branch low. They are not affected by the wind so much as the Ceara, probably on account of being smaller and more low-lying. This also affects the methods of tapping. The foliage is characteristically green and fresh looking.

There are a number of plantations around Bahia, some of which are now four years old. They are planted for the most part 1,000 trees to the acre. This planting has been adopted because the trees are planted in a dry locality, and it is claimed that if not planted so closely, or say 200 to the acre, the ground would be baked hard and be so dry that the trees would dwindle and die; also the trees are considerably smaller than the other varieties, and consequently need less room.

The yield of the trees is variously stated to be all the way from 2 lb. to 11 lb. per year.

Dr. Ule considers that the *Manihot dichotoma* has the advantage of its caoutchoue, bringing a somewhat higher price. On the other hand, the amount produced in the other varieties is considerably greater, according to him. He therefore prefers these latter varieties, which he considers will supplant the Ceara for the dry and less fertile areas where the Ceara is cultivated. There is no doubt, however, that all these varieties yield more than the Ceara.

Dr. Ule says: "If, as is probable, the cultivation of Pará will undoubtedly obtain the greatest importance for the production of rubber in luxuriant tropical regions, the future has to look to *Manihot Heptaphylla* and *Manihot Piauhyensis* as the rubber plants for the dry and less fertile areas."

Of course, it is only fair to say that other observers speak as highly of *Manihot dichotoma*, whch he has left out of his statement.

To sum up, then, there are several reasons why the planters of Papua sould direct their attention to these varieties:—

(1) In the first place, the industry here is in its infancy, and we should endeavour to test all the different varieties of rubber-yielding trees which seem to promise well, for we do not know yet which species will prove the best in the long run, all things considered, such as early yield with constant tapping, amount of yield, cheapness of collection, quality of rubber obtained, &c., a balancing of all of which will give us finally the best species to cultivate most largely. The present plantations must necessarily do a great deal of pioneer work in this line, if we consider the industry for the territory as a whole. After the present companies have shown what can be done commercially with the different species, no doubt many plantations will follow this lead.

(2) These varieties in their habitat yield larger quantities than the Ceara, and yet thrive under similar or severer conditions to those in which the Ceara thrives.

(3) Most important of all here are the varieties which promise the lowest cost of collection, which, quality being equal, is, as I have said, the pivotal point in regard to the whole industry in Papua.

Ficus is an extensive old-world genus, but only a few of the many species produce rubber of commercial value. *Ficus elastica* (Rambong or Assam rubber) is the most valuable species, and is now cultivated in India, Ceylon, British Malaya, Java, and Sumatra, but not nearly as extensively as was expected a few years ago, possibly due to higher price obtained for Pará rubber and its more regular yield of latex. In Java and Borneo, however, the Dutch are planting it extensively, and it is estimated that in Java and Sumatra alone there are over 400,000 acres under *Ficus elastica,* and the Dutch planters in these islands are as scientific agriculturists as there are in the world, and they have proved at exhibitions in Malaya they can produce an article equal to the best hard Pará.

Ficus elastica is one of the earliest known of Asiatic rubbers, and was first brought to notice by Dr. Roxburgh over a century ago. In the wild state the plant is epiphytic, growing on other trees or rocks, and appears as a small crown or crest of short branches on long, rambling aerial roots. Under cultivation it is grown as an arborescent tree, and develops stout lateral branches and a consequent larger area of bark for tapping. On most of the estates in the Netherlands Indies the aerial roots are pruned off and the tree is cultivated as a standard—*i.e.*, a bushy crown and large main stem.

In habit there are marked varietal types of this species:—

(1) The Assam type has a straggling habit with pale-green, rather long, narrow leaves and the yield of latex is only moderate.

(2) The Malayan type is of compact habit with large green leaves (on young trees) and brilliant coloured stipules. The yield of latex is considerable, provided the period of recuperation is a lengthy one.

(3) The Sumatra type resembles the Malayan plant, but is more ornamental in form. The leaves are deep, shining green and more elliptic, and like its Malayan brother, the yield of latex is large if not tapped too frequently.

Formerly Rambong rubber appeared on the market in scrap form only, as the bulk of it does at the present time; but producers are now taking greater pains in their preparation, with the result that in many instances they are getting top prices for their rubber.

The yields of dry rubber from Rambong are larger than from Pará.

There are some good specimens of Rambong at and in the district around Samarai, which are well grown, and on tapping give an excellent flow of latex; and it seems to me that district is well suited for this plant.

Castilloa elastica is a native of Central America, including Mexico, Guatemala, Nicaragua, Panama, Honduras, and parts of Colombia, and

when fully grown is the largest of all rubber trees. Owing to excessive tapping and very often felling, most of the large indigenous trees have been exterminated; but a considerable area in Mexico, estimated at over 100,000 acres, is already under cultivation—a fact which must not be lost sight of in considering the future prospects of the rubber market. In the West Indies, too, cultivated Castilloa is a rubber which it is expected will be heard of in the future. On one plantation in the southern portion of the Island of Mindanoa, P.I., where I was frequently a visitor, they had a large area under Castilloa, and the owner informed me that after experimenting with Pará, Ceara, and Castilloa he was quite satisfied that Castilloa was the rubber for his district, which had a climate very similar to that of Samarai.

The nerve or tensile strength of Castilloa is not so good as that of Pará, and the rubber has never obtained so high a price.

Funtumia elastica (Lagos silk rubber) was first reported from Lagos in 1894. It is widely distributed on the west coast, and is also abundant in Uganda. Unlike the climbing Landolphias, to which Funtumia is allied, this species forms a medium-sized tree, and admits of easy cultivation. Its discovery has compensated the African output for the loss of Landolphia rubbers through excessive tapping. Improved methods of preparation are being carried out in Africa, but much of the trade rubber is prepared by boiling, a method open to objection; and the market price of such rubber is about 2s. 8d., with fine hard Pará at 4s. 6½d.

One might go on indefinitely naming rubber-producing trees, but I think these cultivatable rubbers will suffice; and I will finish this article by giving a description of a very low-grade rubber mostly procured in Borneo and Sumatra, because the latex of the breadfruit palm appears to me to very closely resemble it, and, while the English market does not take it, still 10,000 tons are shipped annually from Singapore to America and Germany, presumably to mix with other rubbers.

I speak of *Dyera costulata* (Getah jelutong), which is a well-known tree in all parts of Malaya. It is a gigantic tree, much larger than Castilloa. Although the latex contains only a small percentage of caoutchouc (about 5 per cent.), a large tree is capable of producing a great amount of latex—reports place the weight at from 2 to 3 cwt.

Dr. Werner Esch, a noted authority on manufactured rubber, wrote the following when rubber was very much cheaper than it is now:—

"To-day Pará rubber has had to be abandoned so far as the manufacture of a considerable part of our India rubber goods is concerned, and its place has been taken by cheaper rubbers. We have to renounce to a great extent the easy workable Pará rubber, and to condescend to take up the wearisome study of the methods of treatment of 'guayule.' Many have been unsuccessful herein on account of inability to fit themselves into the new conditions and surroundings."

Jelutong rubber is used in Germany for compoundings and fillings, as with low-priced goods the best rubbers are prohibited and with some other goods it is claimed that the article is improved by such adulteration.

Owing to its poor grade and low price obtained for jelutong rubber, its cultivation does not attract private enterprise, but, considering the demand, the importance of this rubber is worthy of attention.

In Malaya, jelutong grows readily anywhere from naturally sown seeds. These are produced on tall trees, and are difficult to collect, as, when the capsule bursts, the seeds, which are flat and thin, are apt to be blown away.

THE SOYA BEAN AND ITS USES.

By E. H. HERON, M.H.A.C.

(*From Cope's Planting Leaflets.*)

For the following reasons the Soya Bean has, during the last few years, risen from comparative insignificance in European countries to a product of great importance. The beans contain a high percentage of oil which can be used largely in the manufacture of soap. The residue is used in the manufacture of cattle cake and meal. As a fodder plant it is rich in nitrogen, albuminoids, and fat, and is fed in the green state as hay and silage; also, it possesses the virtue of enriching the soil in nitrogenous compounds by means of its root nodules and thereby improving and rejuvenating the soil for succeeding crops, such as maize and others, and also for cocoanut plantations.

Over 500,000 tons of Soya Bean seed were imported into Europe from Manchuria in 1910.

The Soya Bean is a leguminous plant, native of South Eastern Asia. It is supposed that it originally occurred in the wild state in the region embracing Cochin China to the south of Japan and Java. It has been cultivated from very ancient times as a food plant, principally in China and Japan; but, although grown in these countries for such an extended period, its cultivation seems to have spread very slowly to the surrounding countries. It has only been introduced into India during comparatively modern times.

This bean has begun to be extensively grown in the southern part of the U.S.A., where numerous experiments are being carried out to ascertain the varieties best suited to the different soils and climates. It is also grown in various parts of Europe, but not to any great extent.

The Soya Bean is an erect annual plant with branching hairy stems, trifoliate, more or less hairy leaves, flowers pale lilac or violet coloured and broad, three to five seeded pods covered like the stem with stiff hairs. The seeds vary in colours from whitish and yellowish to green, brown, and black, and in shape from spherical to elliptical and more or less compressed.

Under favourable conditions the plant may reach a height of 4 ft. or more; it bears prolifically. In experiments very often more than 100

pods have been obtained from one plant, but in a field crop a good average would be forty. The flowers are self-pollinated, which makes the yield entirely independent of insects and renders the plant free from an important obstacle in the way of introduction to new regions. A crop of seed is ensured wherever conditions are such as to allow the plants to make the proper vegetative growth and reach maturity.

VARIETIES.

There are over 200 varieties of Soya Bean which are distinguished according to the colour, size, and shape of the seed, and the time required for the plants to reach maturity. This large number of varieties can be formed into six groups—yellow, greenish yellow, black, brown, green, and white.

THE YELLOW.

The yellow is one of the best varieties to grow. It has the largest growth of all the Soya Beans; it is rich in oil (17 to 19 per cent.), albuminoids, carbohydrates, and nitrogen. Under average conditions it will grow from 3 to 5 ft., depending principally on the character of the soil. Ordinarily it requires from 120 to 150 days to mature a crop of seed. The average yield ought to be, on fairly good soil, 30 bushels per acre (600 kilograms). It is a most exacting variety about the depth of planting, and under no circumstances should the seed be planted more than 2 in. deep. The habit of growth is such that it can be readily harvested with machinery, and it is frequently gathered with a grain binder. One of the yellow varieties known as "Southern" has given very good results in Natal and also in the Northern Transvaal. This variety should grow well on the East Coast of Africa. The yellow varieties are most favoured by all the European burghers.

THE GREENISH-YELLOW.

Vigorous though not coarse, a medium late variety, growing 3 to 4 ft. high with numerous branches, but none close to the ground. It can be easily harvested with machinery, and is a good seed-producer.

THE BLACK.

This bean requires a very long season in which to make its full development, and is therefore adapted only to the cotton belt. The seed is rather small, elongated, and flat, and is covered with a powdery bloom which makes it look dusty. The plants grow from 4 to 6 ft. high, but have fine stems, and so are useful for hay. It contains 16.80 per cent. of oil. After all the oil has been extracted, the residue is used in large quantities by the Chinese and Japanese, who make a favourite condiment called "Shoja"—soy sauce—which is of a darkish-brown colour and is largely exported to Europe for sauce-making purposes.

THE BROWN.

This variety is excellent for hay, as it is tall and has fine stems and branches. It gives a large yield of seed, but its tall habit often makes it inclined to fall. It matures in 110 days. The seeds are large and break easily on threshing.

THE GREEN.

This grows very extensively in North China, and is considered one of their best eating beans, containing about 17 per cent. of oil. The seed is kidney shaped, green throughout, and much larger in size than any other variety. It is very coarse, matures in ninety days, and grows about 3 ft. high.

THE WHITE.

This variety grows abundantly in China, Darjeeling, Himalaya Mountains, and in India is known as "Glycine Soja-Bhat." It is one of the staple foods of both countries, and contains about 16.60 per cent. of oil.

SOIL.

In Japan the Soya Bean grows well in soil of rather strong character; while in Europe and America it has done well on comparatively light soils, often giving an abundant crop on soils too poor to grow clover. Good results have been obtained in Europe and America on a great variety of soils. In South Carolina the Soya Bean gives excellent crops on sandy limestone or marly soils, also on drained swamps that have been well marled. Experiments in both Europe and America show that the Soya Bean possesses excellent drought-resisting qualities, enduring dry weather much better than ordinary field or garden beans. As a general thing it is not easily injured by light frosts, and hence it can be planted early in the spring or can be left in the field late in the autumn.

While the Soya Bean is possessed of excellent drought-resisting qualities, it, at the same time, seems to be able to survive a period of excess of moisture better than cowpeas or even maize.

The Soya Bean is especially adapted to the maize and cotton belts, where the later varieties grow exceptionally well. Generally speaking, the Soya Bean requires the same temperature as maize; the soil requirements being much the same, it will make a good growth on poorer soil than maize requires, provided that inoculation is present. The Soya Bean makes the best development on fairly fertile loams and clays. The yellow variety also succeeds well on sandy soils.

On very rich soils all varieties are apt to make a large plant growth and a comparatively poor yield of seed, and in the poorer soils a small plant growth with a relatively large seed yield.

METHODS OF CULTURE.

In a general way the same methods of culture may be recommended for the Soya Bean as would be given to the ordinary field beans. The soil should be well prepared so as to afford a good root bed, and should be left smooth and free from clods in order to facilitate the cultivation and harvesting of the crop. Under ordinary conditions it is not likely that there will be any necessity for using any nitrogenous fertiliser, as sufficient nitrogen is usually present in the soil, and, like other legumes, this plant assimilates the free nitrogen of the air. Although the Soya Bean may be planted quite early in the season, the best results will be obtained if the sowing is put off until the ground has become thoroughly warm. A good practice is to drill the beans in

between the rows of maize after the last cultivation or tilling. If the soil is good and a crop of hay or green fodder is desired, good results may be obtained by sowing broadcast. If, however, a crop of beans is desired, it is best to plant in drills from 2 to 3 ft. apart, according to the quality of the soil. The cultivation of Soya Beans is a very simple matter unless conditions are very unfavourable; the seedling plants appear above the ground in a week, and horse hoe cultivation may then begin. Flat cultivation is preferable because if the rows are hilled harvesting cannot be done easily. The Soya Bean can be planted any time from early spring up to midsummer. Generally, early plantings require more time to mature than late plantings, the difference in the same variety often amounting to as much as three weeks.

QUANTITY OF SEED SOWN PER ACRE.

There is a great difference in the amount of seed sown per acre in the various regions. Some farmers sow only half a bushel per acre, whilst others prefer one bushel. It all depends upon the method of sowing and the character of the soil. When sown broadcast, about a bushel of seed is required, and when put in with a drill, from half to three-quarters of a bushel is required. When a seed crop is required, enough seed should be used to give five or six plants per foot in the row, the rows being on an average 2½ ft. apart. It is best to cultivate the beans soon after planting—first of all with a horsehoe to keep down the weeds and retain the moisture. If sown broadcast, very little cultivation is necessary except at first, as the bean plants will soon smother the weeds. When a crop is drilled in for seed, a shallow and frequent cultivation is necessary to obtain the best results, but it need not be continued after the plants shade the soil. As a rule, the crop will require a smaller amount of cultivation than maize.

THE INOCULATION OF SOYA BEANS.

Like other legumes, the Soya Bean is able to utilise the nitrogen of the air and add it to the soil by means of root nodules. These nodules are caused by certain bacteria; unless they are present, Soya Beans in the usual types of soil will make a weak growth, and many of the plants will turn yellow and die. In isolated localities, where the crop has not been grown, some difficulty may be expected from lack of inoculation during the first season. Inoculation of a new field may be secured either by the soil-transfer method or by the use of pure cultures. The soil-transfer method consists in scattering soil from an old well-inoculated Soya Bean field over the new ground at the rate of 200 to 300 lb. per acre. To ensure even scattering, this should be thoroughly mixed with several times its weight of ordinary soil. The scattering should be done on a cloudy or even a wet day, or late in the evening, and harrowed in immediately, as bright sunshine is very harmful to the germs. When the first crop is a failure in isolated places where neither pure culture nor inoculated soil can be obtained, a small crop must be grown successively two or even three times on the same plot till a good growth is apparent, showing that the soil has become inoculated; this soil can then be used to inoculate large areas.

HARVESTING FOR FORAGE.

The time for harvesting the Soya Bean will necessarily depend somewhat upon the use for which the crop is intended. If required for green forage, it is best to cut the plants just as the pods are forming, as, considering palatability and digestibility as well as chemical composition, most can be gained by cutting at this stage. Generally speaking, if the crop is to be used for soiling purposes, cutting can begin when the plants are in early bloom, and can be kept up till the pods are beginning to ripen.

HARVESTING FOR SEED.

Under ordinary conditions the earlier varieties will mature in seventy-five to ninety days from the time of planting. It is generally desirable in harvesting a crop for seed to cut before the pods are entirely mature. If they become too ripe, they are liable to burst open in driving and carrying to the machine, and thus a large part of the seed may be lost. Some farmers recommend cutting for seed when the pods are only half mature. This is a good practice if the straw is to be used for feeding purposes, as it is then more palatable and contains a larger amount of digestible nutrients than when the pods are thoroughly mature. Seeing that the pods mature unevenly on the same plant, it is best to cut for seed when the pods have turned brown, but before they are fully ripe, so as to avoid loss from the lower pods. Harvesting may also be done when the leaves begin to fall.

THRESHING.

Threshing can be done with a flail or with a threshing machine; the plants should be allowed to become thoroughly dry after cutting before they are stocked or put into a barn or shed; they should not be allowed, however, to become too dry or brittle in the field, as much seed may be lost. Threshing is most satisfactorily done in the field without previous stacking, if climatic conditions will permit.

YIELD OF SEED.

Under ordinary conditions, 25 to 40 bushels of seed per acre (from 1,280 to 2,100 kilograms per hectare) would be an average yield. On comparatively poor soils 20 bushels of seed per acre can generally be obtained.

AVERAGE ANALYSIS OF THE SEED OF THE SIX VARIETIES OF SOYA BEANS.

Water		7·70
Fresh or air-dry substance	Fibre	4·60
	Fat	20·35
	Nitrogen-free extract	26·15
	Protein	35·40
	Ash	5·79
		100·0

YIELD OF FORAGE.

The amount of forage obtained will, of course, vary largely according to the conditions under which the crop is grown. Under very favourable conditions as much as 12 tons of green fodder may be produced per acre; under ordinary conditions on fair soil, 7 to 8 tons ought to be obtained. In U.S.A. and Japan the amount of cured hay obtained is about 2 tons per acre. Owing, however, to the coarseness of the stalks, the hay is not eaten as readily as other legumes, so for this reason the Soya Bean can be more advantageously used for green forage or ensilage.

ANALYSES OF GREEN FODDER AND CURED HAY.

GREEN FODDER (EARLY BLOOM TO EARLY SEED).

Water		76·5
Fresh or air-dry substance	Protein	3·6
	Fat	1·0
	Nitrogen-free extract	10·0
	Fibre	6·5
	Ash	2·3
		100·0

CURED HAY (U.S.A.).

Water		12·1
Fresh or air-dry substance	Protein	14·2
	Fat	4·1
	Nitrogen-free extract	41·2
	Fibre	21·1
	Ash	7·3
		100·0

AS PASTURAGE.

The Soya Bean crop can often be profitably utilised for pasturing, particularly for pigs and especially when maize is given in addition. This is advisable when harvesting is interfered with by lack of labour, bad weather, or other causes, or when the crop is grown especially for soil improvement. By this means not only is the crop profitable in itself but the manure is returned to the soil. The usual practice is to turn the hogs into Soya Beans when the pods are nearly full of grain, but before they have begun to ripen.

AS A SOIL RENEWER.

One of the great advantages in growing leguminous crops is the benefit which the soil derives from the nitrogen and other important elements of plant food that are left in it by the crops. Soils that have been impoverished by the continuous growth of cereals or other nitrogen-using crops may be restored to fertility by the cultivation of legumes, such as clover, vetches, lupins, and the Soya Bean. The value of the Soya Bean as a soil restorer depends upon the amount of available plant food which it adds to the soil, and also upon the effect which the roots have upon the mechanical conditions of the soil. Leguminous plants, through the aid of root tubercle-organisms, are able to add to the

available nitrogen of the soil, and hence are extensively used in restoring those deficient in that element. The Soya Bean should be an invaluable crop in all planting districts. It could be planted in cocoanut plantations, to enrich the soil, give fodder to the working cattle, and be a source of profit in supplying food to the natives; the surplus seed being sold readily in South Africa. It also helps in keeping down the weeds.

SOYA BEAN MEAL AND CAKE.

Soya Bean meal and cake have been found to be a most excellent food for dairy cows. It increases the quantity of the milk and improves the quality of the butter, giving it a firm texture and thus improving its keeping qualities; 2 lb. of meal per day is a fair ration for a dairy cow; the cake or meal should be first softened in water and well mixed with lucerne or any other forage given. As can be seen from the analyses, both the meal and cake are rich in oil, albuminoids, and digestible carbo-hydrates.

——	Cake.	Meal.
Water	12·70	11·33
Oil	11·07	43·05
Albuminoids	26·51	30·77
Digestible carbo-hydrates	26·51	30·77
Woody fibre	5·80	5·45
Mineral waters	5·05	5·35
Sand and silica	0·35	0·25
Total	100·0	100·0

The analyses of the meal and cake compare very favourably with the meal and cake of cotton seed and ground nut, but, according to experiments with cattle, the Soya Bean is slightly more digestible. In West Africa great progress has been made in the cultivation of the Soya Bean, where the percentage of oil in the beans is higher than in those from Manchuria, Japan, and U.S.A. There is no reason at all why East Africa should not do just as well and introduce the Soya Bean as another staple crop. Taking into consideration the rainfall, climatic conditions, and the rich, sandy and open nature of the soils found in the higher land in Gaza and Inhambane, the Soya Bean should prove a profitable crop. For East Africa I should advise the yellow variety to be grown. It is hardy; yields a heavy crop; is easily cultivated; it is the variety most favoured in European markets. The yellow variety, known as "Southern," has proved successful in the Transvaal.

SUMMARY.

1. For extensive farming the Soya Bean is the best annual legume to grow for forage in the cotton belt and maize belt.

2. The Soya Bean, whether used as hay, grain, or ensilage, is very valuable as food for live stock.

3. Soya Bean hay is practically identical in feeding value with lucerne, and yields from 2 or 3 tons of hay per acre.

4. Soya Bean grain is more valuable than cotton seed as a supplementary food in the production of pork, mutton, beef, milk, and butter. A bushel of Soya Beans is nearly twice as valuable for food as a bushel of maize. The grain is best ground with an equal quantity of maize before feeding.

5. Generally, harvesting for seed should be done when all the leaves have fallen from the plant.

6. Mixed with green maize, the Soya Bean is excellent for ensilage. The two crops can be grown together, but it is best to plant in separate fields and mix when putting into the soil.

7. It is necessary to give the soil thorough preparation in order to be successful with Soya Beans. Only fresh seed or seed which has been tested for germination should be planted. Two-year-old seed is usually not reliable. The seeding should be shallow, not exceeding 2 in. in depth, and preferably in rows 30 or, better, 36 in. apart to permit of sufficient cultivation.

8. For harvesting Soya Beans, a mower, with or without a side-delivery attachment, a self rake reaper, or a self binder, can be used. A binder can be used only with tall varieties. The threshing can be done with a threshing machine, flail, or by machines specially designed for handling Soya Beans and cowpeas.

9. As a crop in a short rotation, Soya Beans are very desirable. They can be grown so as to use an entire season in the case of late varieties, or two crops in one season can be secured from some of the early varieties. They can also be used very advantageously to follow a small-grain crop the same season.

THE GUADA BEAN.

(TRICHOSANTHES CUCUMERINA.)

We have received the following interesting description of a plant of the Gourd Family, locally termed a bean. In a footnote, Mr. F. M. Bailey, Colonial Botanist, gives the botanical name of this vegetable. Mr. B. Harrison, of Cudgera Park, Tweed River, who has had much success with this vegetable, writes:—

"Having grown this vegetable for the past season, and knowing how valuable it would prove to Queensland residents especially during the hot, dry, summer months, when vegetables are scarce and difficult to cultivate, I deem it my duty to forward you the information and trust you will kindly publish it for me. I was induced, through reading the following paragraph in one of our papers giving a description of the Solomon Islands, to procure and import some seed, in which I succeeded after some trouble and expense:—

"The writer ('Banaki') says:—'On the kitchen table is an enormous bean which arrests my attention. It is 7 ft. long, and is named "The Guada." Both the pod and beans are edible, and are eaten as French beans are. This green, succulent-looking, delicious

streak is to be cut up into slices and is intended for our host's family dinner to-night, and it would amply provide sufficient vegetables for one meal for half a dozen hungry people.'

"This vine grows from 15 to 20 ft. long, and will bear throughout the year until checked by frost. The flowers are white and fringed and scented, and have five and six petals. The vine bears within a month or two after planting, and produces long, narrow, cucumber-shaped fruit varying in length from 3 to 6 ft., when over-ripe they turn various colours—orange red, and green, with white stripes. They form a delicious dish when used at the right stage, and, apart from being cooked, they make a good substitute as a pickle for cucumbers. They should prove a most useful and prolific adjunct to the vegetable garden more especially during the hot summer months.

"Mr. R. Gillies, Cudgera, Tweed River, to whom I gave a seed some time ago, thus writes to one of our papers *re* this bean:—'I can testify to their value as a table vegetable. Mr. Harrison gave me one bean in January last; from this single seed I have grown about 25 lb. of beans from the one vine, which is growing and bearing heavily yet. Single beans have measured up to 5 ft. 4 in. in length, and to 2 lb. in weight; and we have frequently served up half a bean for a meal. It is usual to expect coarse flesh and rank flavour in such bulky vegetables. but such is not the case with the Guada (or "carpet-snake bean," as it has been locally named).'

"If taken before the beans have quite set in the pod, sliced, and cooked like French beans, and served with white sauce, it is quite a luxury in the bean line. In appearance the Guada resembles a long cucumber rather than a bean."

[Mr. Bailey thinks the plant referred to by Mr. Harrison is *Trichosanthes anguina,* or Snake Gourd, which has been grown in Queensland and for a long time cultivated in Asiatic countries as a vegetable. It is one of the Cucurbitaceæ or Gourd Family.—Ed. "Q.A.J."]

BANANA FIBRE.

Some time ago a report was made by some British experts in fibres that, in their view, some banana fibres submitted to them were "very weak, poor in colour, and woody, only fit for paper, and worth about £7 to £8 per ton." This decision was probably founded (says "Rubber World") upon an inferior or badly scutched sample. Imperial Institute reports upon valuations of banana fibres from British East Africa and other tropical colonies are in many cases very favourable, the valuations ranging from £10 to £50 a ton and averaging over £30, with manila at £36. It is true many of these fibres were from wild plants or from plants not cultivated for their fruit; in many cases they were from varieties distinct from the West India banana. But in at least one case the fibre was from *Musa sapientum,* and was valued at £36 per ton,

with manila at £36. No doubt Mr. Fawcett's opinion is sound at the moment, but an alteration in the values of fruit or fibre, in conjunction with good scutching, might at any time make West Indian banana fibre production profitable. As for the manurial value, the cellulose of the chopped stem might have a mechanical effect upon the soil, but it would have no plant-feeding value. Were the stem scutched on the spot, the waste of the machines would probably prove as useful a manure as the whole stem.

[Fibre from the *Musa Cavendishii* was brought to this office over a year ago, almost equal in strength and fineness to Mauritius hemp, extracted from the *Furcrea gigantea*, and then valued at £27 per ton.—Ed. "Q.A.J."]

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1911.								1912.				
	May.	June.	July.	Aug.	Sept.	Oct.	Nov	Dec.	Jan	Feb.	Mar.	April.	May.
North.													
yr	...	...	...	...	...	...	...	...	...	...	3·53	...	1·01
owen	0·12	0·2	Nil	0·15	Nil	1·5	0·19	1·32	1·56	3·15	1·86	...	1·76
airns	2·08	1 44	1·48	0·27	0·6	0·88	1·95	0·90	4·81	16·68	5·95	...	5·97
eraldton (Innisfail)...	3·58	5·10	6·20	0·79	0·30	0·73	1·61	0·75	5·50	18·24	6·01	...	41·84
ndie State Farm ...	0·29	Nil	Nil	0·49	...	0·81	...	3.50	0·68	2·59	1·88	0·63	..
erberton	0·58	0·36	0·4	0·5	Nil	0·9	0·62	5·36	5·29	2·82	1·47	...	2·20
ughenden	0·4	0·2	0·2	Nil	Nil	Nil	1·37	0·69	5·78	1·84	3·52	...	0·74
amerunga State Nurs.	1·51	...	...	...	...	...	...	...	...	...	...	...	...
ackay	0·77	0·22	0·43	0·18	0·3	0·93	0·17	0·41	2·08	8·04	·93	..	3·42
ossman	1·44	0 33	1·28	0·39	0·09	0·55	0·86	3 31	6·06	18·32	17·60	6·40	2·78
ockhampton	0·56	Nil	0·24	1·17	Nil	0·40	0·6	0·81	2·50	3·24	·14	...	1·98
ownsville	0·7	0·11	Nil	Nil	Nil	0·39	0·31	2·84	1·64	7·57	6 35	...	0·63
South.													
ggenden State Farm	...	..	...	...	0·79	...	...	...	...	...	...	...	...
risbane	0·90	0·9	1·70	2·22	0·84	4·95	0·84	1·94	1·85	2·13	1·03	...	0·20
ndaberg	0·56	Nil	0·37	1·15	Nil	2·36	1·30	2·98	3·96	2·47	...	...	1·33
ngeworgorai (Roma State Farm)	...	...	...	...	...	...	...	...	0·73	...	2·19	Nil.	...
ohamhurst	1·21	0·13	3·58	2·62	0·51	6·27	1·74	3·02	5·62	8·72	31·73	1·77	...
lby	0·91	Nil	0·68	0·43	0·42	3·45	1·99	1·55	1·76	2·58	·53	...	Nil
k	1·90	Nil	...	1·51	2·04	4·17	0 47	0 44	1·38	8·26	·22	...	0·11
tton Agric. College	0·58	Nil	0·72	0·90	0·96	3 77	0·49	1·90	3·56	3·31	7·86	0·31	...
mpie	0·32	Nil	0·97	0·48	0·26	2·42	0 50	2·10	2·92	4·47	·15	...	0·52
swich	0·42	Nil	0·59	1·12	0·34	4·71	0·25	...	1·87	3·00	·41	...	Nil
ryborough	0·16	0·11	0·62	1·47	0·9	2·81	0·90	4·98	2·39	3·93	·11	...	1·09
ma	1·13	Nil	0·67	1·55	0·87	1·9	1·55	1·19	0·74	0 76	·85	...	Nil
ma State Farm ...	·02		...	1·39	0·74	1·31	1·29	1·45	...	0·80	...	...	...
wantin	0·57	0·22	2·53	1·07	0·4	7·48	1·14	2·13	5·60	4·25	·85	...	8·46
owoomba	...	...	...	...	...	...	...	...	...	...	·52	...	0·16
rren State Farm ...	...	Nil	0·6	1·01	...	0·64	..		0 82	1·75	2·04	0·22	1·28
rwick	1·04	Nil	1·20	1·50	0·80	1·78	2·26	0·70	1·57	3·45	·56	...	0·9
rwick, Hermitage State Farm ...	..	...	...	...	...	0·60	...	...	...	...	...	...	...
stbrook State Farm	0·79	0·1	1·1	0·54	0·82	1·77	2·68	0·23	1·16	2.33	4·48	Nil.	·12
ndina	0·28	Nil	2·43	Nil	0·30	2·90	1·36	1·87	5·95	4·84	·95	...	1·39

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

Animal Pathology.

A FEW NOTES ON INDIGESTION IN CATTLE.

By A. H. CORY, M.R.C.V.S.

It must be remembered that the stomach of ruminants is composed of four compartments—viz., the rumen (or paunch), the reticulum (or honeycomb), the omasum (or bible), and the abomasum (or true stomach).

The various forms of indigestion are—

1st. The accumulation of gases in the rumen (paunch).
2nd. Impaction of the rumen (paunch).
3rd. Impaction of the reticulum (honeycomb).
4th. Indigestion of the abomasum (true stomach).

THE ACCUMULATION OF GASES IN THE RUMEN—"HOVEN" OR "TYMPANITES."

CAUSES.—When an animal is not too well, external influences, such as sudden changes of temperature, excessive heat or cold, affects them, and is, therefore, a great predisposing cause. Other causes are feeding on young succulent lucerne or sorghum, and turning animals suddenly on to a fresh spring of grass or any other food which ferments and causes the formation of gases. Choking also causes tympanites, but in this case it is due to the gullet being blocked when the normal gases cannot be eructated by the animal. Gases frequently form in the rumen when wire or other foreign bodies are in the stomach penetrating the wall, and the animal is afraid to ruminate, the ordinary functions of the stomach consequently being altered.

SYMPTOMS.—The animal appears uneasy, refuses to eat, and in a few minutes the left flank begins to get prominent. The right flank may also appear full (but not to the same extent as the left); this is due to the extended rumen pushing the bowel out of its normal position. As the left flank increases in fullness, the animal becomes greatly disturbed, the breathing is very rapid, the nostrils are dilated and the mucous membranes of eyes and nostrils become congested and much darker than normal in colour. In acute cases the animal refuses to move, and finally falls down to die from carbonic-acid poisoning and suffocation. The progress of this affection depends largely on the nature of the food causing the trouble. Cattle and sheep may die in less than one hour, although in most cases the symptoms come on slowly and the animal may be blown for twenty-four hours before recovery or death takes places. It must be noted that the quicker the gases accumulate, the more serious is the case, and the treatment more urgent.

TREATMENT.—To prevent hoven, never suddenly change the food of animals, as from dry food to green succulent lucerne or grass. Let the

change be gradual, as is accomplished by mixing the green and dry food together, or by only allowing the cattle on the fresh green feed for a very short time.

CURATIVE TREATMENT consists of giving the animal a drench containing 2 oz. of turpentine in 1 pint of raw linseed oil, well mixed together and given slowly; or give 4 oz. of hyposulphite of soda and 2 oz. of aromatic spirit of ammonia mixed in 1 pint of cold water. These drenches largely prevent further fermentation, and can be repeated in two hours if the animal is not relieved. Well massage the left flank from above downwards; this assists the over-distended rumen to contract and thus force some of the gas into the other compartments of stomach and also into the œsophagus (gullet). Sometimes a piece of wood about 1 ft. long (part of a broom handle) is placed in the animal's mouth, similar to a bit, and kept in position by means of a piece of cord being attached to each end and passed over the head, like a bridle; this causes the animal, in some cases, to eructate gases. In very sudden cases, it will be necessary before giving any internal medicines to puncture the rumen with a trocar and canula. The spot chosen for puncturing is on the left side, equally distant from the hip bone, the short ribs, and the last long rib. When one has determined the spot, the trocar and canula is quickly inserted, the direction being inward, downward, and slightly forward. The trocar is now withdrawn, when the gases rush out; the canula should be left in position until the gases cease to come from it. If the canula becomes choked with partially digested food, it must be cleared by passing the trocar again through the canula. It is sometimes necessary to leave the canula in position for twenty-four or forty-eight hours, in which case it should be tied there by means of a piece of cord or tape being attached to it and then passed around the animal's body. In all cases, after the acute symptoms have disappeared, it is advisable to give a purgative to remove the fermenting food from the rumen; ¾ lb. of Epsom salts and 1 oz. of ginger, mixed in 1½ pints to 2 pints chilled water, will answer the purpose.

The other forms of indigestion will be continued later.

General Notes.

PREPARING BOTANICAL SPECINENS FOR TRANSIT.

Mr. F. M. Bailey, Colonial Botanist, gives the following directions for collecting botanical specimens which have to be sent by post for naming. It often happens that correspondents forward to him a flower, or a few leaves, or some portion of a plant, which it is next to impossible for him to determine owing to the neglect of the sender to observe certain conditions which are here set forth:—

A botanical specimen is such a portion of a plant as may enable a botanist to determine its name, &c. Thus, of a tree or shrub, a shoot, say 6 in. or 9 in. long, bearing leaves, flowers, and fruit, if possible, will be sufficient. Of herbs when small, an entire plant should be sent, collected when in flower. Of herbs of a large size, a portion of the lower (radical leaves), and also a portion of the top, in flower or seed. All specimens should represent the typical form—not an abnormal or irregular growth, except to show such growth. After gathering, place the specimen between sheets of paper (old newspaper), and put the whole under a slight pressure; these papers should be changed for dry sheets every day for three or four days, when, if the specimens are not of a succulent nature, they will be in a fit state to forward by post, the cost of which will be 1d. for every 2 oz. from any part of the State; or by parcel post, the cost of which is 6d. for first lb. and 3d. for each additional lb. up to 11 lb. Parcels should be marked "Botanical Specimens Only," and addressed to the "Colonial Botanist, Brisbane." Number specimens, and retain duplicates.

RICE-GROWING EXPERIMENTS.

In our June issue it was stated that the experiments in rice-growing were carried out at the Roma State Farm, whereas it was at the Warren Farm that the rice was grown.

Answers to Correspondents.

TABLE OF UTERO-GESTATION.

Animal.	Average Period.	Early Period for Young to Live.	Late Period.
Mares	335-345 days (11-11⅓ months)	307 days (10 months)	365 days (12 months)
Cows	275-287 days (39-41 weeks)...	242 days (34½ weeks)	312 days (44½ weeks)
Sheep and goats	149-151 days (21-21½ weeks)	140 days (20 weeks) ...	160 days (23 weeks)
Sows	112-119 days (16-17 weeks)...	105 days (15 weeks) ...	126 days (18 weeks)
Bitches	63 days (9 weeks)	55 days (8 weeks) ..	70 days (10 weeks)
Cats	55 days (8 weeks)	50 days	64 days
Rabbits	28-30 days (4 weeks) ...		

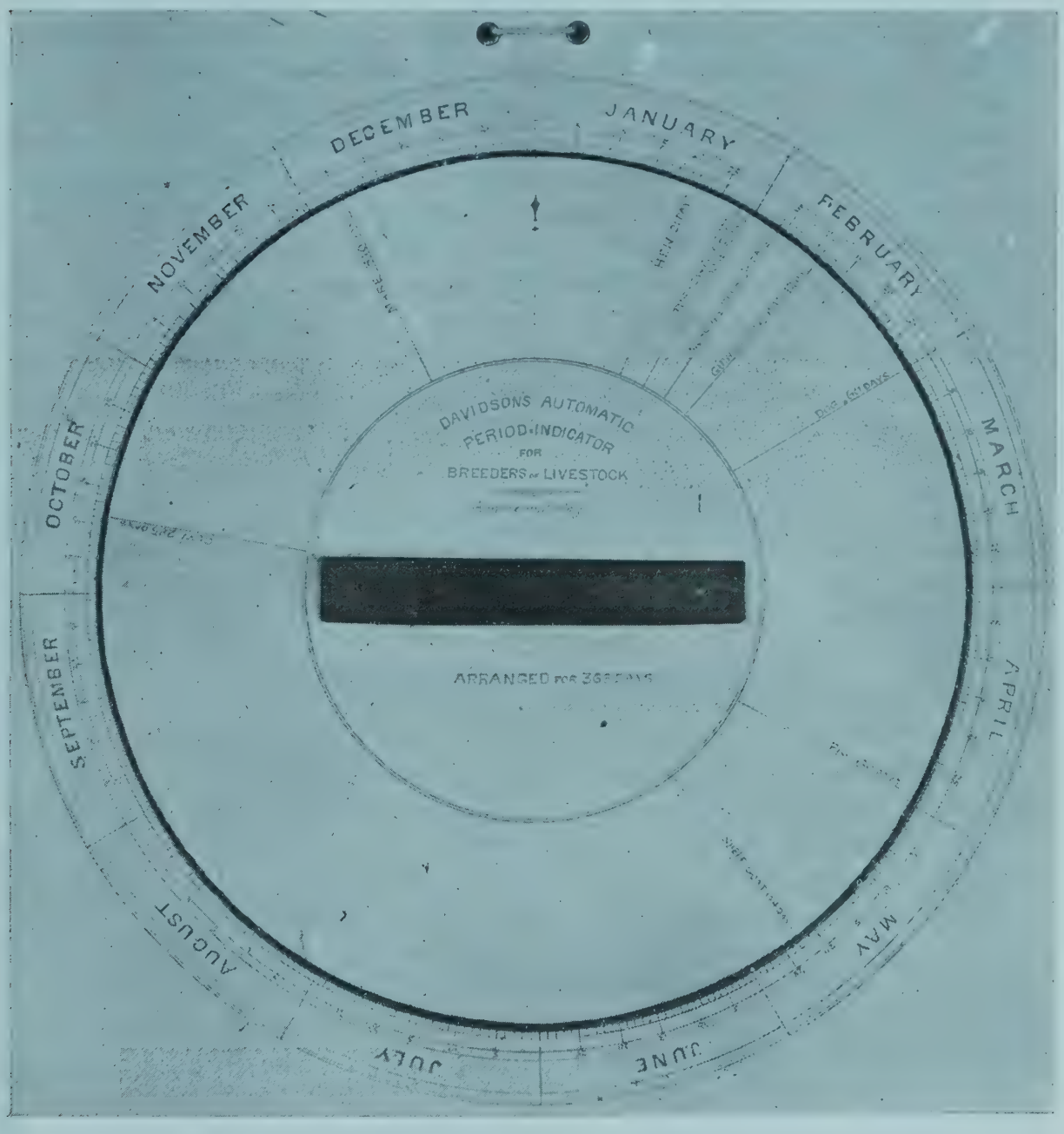


PLATE 13.—DAVIDSON'S AUTOMATIC PERIOD INDICATOR.

INARCHING.

"VIGNERON," Eumundi—

This may be performed with either the growing shoot or with that in a rest state. A plant established in a pot, of the kind to be introduced, must be procured. With regard to inarching in a rest state, it is proper that the sap should be in motion at the period of operating, and that the stock, if possible, should, as in grafting, be slightly in advance of the scion. Vines which are breaking are in an eligible state, and the kind to be inarched may be just emerging from a rest state.

The point of junction being determined, the pot must be so fixed that no slipping can occur, and that the shoot may be readily bent to meet the parent plant. Nothing is necessary but to pare a thin slice of bark with a little of the wood from the facings of the scion and stock which are to be fitted, and then to bind them carefully together close, but not too tight, just as in ordinary grafting. A little moss may be fastened round the point of junction, and this should be frequently moistened. Inarching of the growing shoot, is, however, the best practice, but it is an operation which requires nice handling. The shoot of the stock is best at about the middle of its annual growth, when it has begun to acquire some solidity and toughness. The scion may be somewhat younger, and, everything being adjusted, a section must be made in each as before, cutting through the bark and a little into the alburnous matter—*i.e.*, the white and softer part of wood next to the bark, familiarly known as the sap-wood—and fitting them nicely together. It may be observed that the ligature must not be so tight as in the old wood. The whole may be covered with moss, and in six weeks the junction will be complete. In the meantime, a progressive stopping of the spray on the stock must take place, in order, by degrees, to transfer a portion of the luxuriance of the stock to the scion.

When the pruning season arrives, the stock may be cut back in part or wholly. Thus a vineyard possessing inferior kinds may be renovated in a very short period.

DESTRUCTION OF NUT GRASS.

J.A., Sunnybank, Gatton—

There has been, as yet, no certain remedy found for the nut-grass pest, except constant cultivation—see the issue of this journal for March, 1911. It is there stated that a farmer on the Clarence River, New South Wales, got rid of it in two years by ploughing the land in winter and keeping the scarifier going with the knives 3 to 4 in. below the surface. Another farmer got rid of it in five years by constantly sowing the land with imphee. Queensland farmers have overcome the grass by planting buffalo grass. Oats will thrive on nut-grass land, so will lucerne. Enclosing the land and running pigs on it has proved successful in the Mary River district (see Vol. V., August, 1899). A flock of turkeys penned on nut grass will eventually destroy it.

CUSTARD APPLES.

R. M'c., Nundah—

Your custard plant is undoubtedly a seedling and should have been grafted years ago. It may still be done by a practical man. Otherwise root it out and plant a good worked tree in its place.

TO CUT THE NECK OR BOTTOM OFF A GLASS BOTTLE.

"FARMER," Nambour—

Get a piece of wire (No. 4 gauge) about 2 ft. long, and turn one end of it to make a circle large enough to pass over the broad part of the neck of the bottle. Put the circle end in the fire till it is red hot; then place it over the bottle neck for a few seconds; take it off and plunge the bottle into cold water. The neck will break off clean just where the ring was placed.

In the old farming days in Queensland, when a good deal of night-work had to be done in the way of loading produce on to farm boats to save a tide, clear glass bottles were used as lamps (snakes being pretty numerous on the tracks). To turn a bottle into a lamp all that was necessary was to fill the bottle up to about 2 in. from the bottom with cold water, set it on the hot ashes as deep as the 2-in. mark, and in a minute or two a crack went clean round the high-water mark, the bottom of the bottle falling off. Then a candle was inserted into the neck, and a useful lamp was provided at no cost.

GROWING CUCUMBERS.

"MARKET GARDENER," Bowen—

Cucumbers require a rich warm soil, and should only be planted when the soil has been well heated. Make the hills 4 ft. apart each way.

Plant plenty of seeds in each hill, and, if more than four come up, the extra ones may be taken up and planted out after the second leaves appear, and transplanted elsewhere. Plant quite deep in the ground, water well, and cover the young plants with paper for the first day or two to keep them from wilting.

The best way to irrigate the plants as soon as they show signs of running is to dig a hole, large enough to hold a quart can, as near the roots as possible. Make holes in the bottom of the can and place them in the holes near the roots of the plants. Put the cans in the ground about 2 in. deep, and fill them with water every other day.

See pamphlet on "Market Gardening," issued by this Department.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JUNE, 1912.

Article.		JUNE. Prices.
Bacon, Pineapple	lb.	6½d. to 8d.
Bran	ton	£7 5s.
Butter	lb.	9d. to 10d.
Chaff, Mixed	ton	£5 5s. to £7 5s.
Chaff, Oaten (Victorian)	„	£7 10s. to £8
Chaff, Lucerne	„	£8 10s. to £8 15s.
Chaff, Wheaten	„	£6 to £7
Cheese	lb.	6d. to 9d.
Flour	ton	£10
Hay, Oaten (Victorian)	„	£8 to £8 10s.
Hay, Lucerne	„	£9
Honey	lb.	2d. to 2¾d.
Maize	bush.	5s. 4d. to 5s. 6d.
Oats	„	4s. 2d. to 4s. 6d.
Pollard	ton	£8
Potatoes	„	£8 to £10 10s.
Potatoes, Sweet	cwt.	3s. 6d. to 4s. 6d.
Pumpkins	ton	£2 10s. to £2 15s.
Wheat, Milling	bush.	4s. 9d. to 5s. 3d.
Onions	ton	£14
Hams	lb.	1s. 1d.
Eggs	doz.	1s. 8d. to 1s. 11d.
Fowls	pair	2s. 9d. to 4s. 3d.
Geese	„	5s. 6d. to 6s.
Ducks, English	„	3s. 6d. to 4s.
Ducks, Muscovy	„	4s. to 5s.
Turkeys (Hens)	„	7s. to 8s.
Turkeys (Gobblers)	„	15s. to 17s.

SOUTHERN FRUIT MARKETS.

Apples (Choice Eating), per case	7s. to 9s.
Apples (Cooking), per case	6s. to 7s.
Bananas (Fiji), G.M., per bunch	2s. 6d. to 10s.
Bananas (Fiji), G.M., per case	5s. to 17s. 6d.
Bananas (Queensland), per bunch	1s. to 5s.
Bananas (Queensland) per case	10s. to 10s. 6d.
Cocoanuts, per dozen	2s. 6d. to 4s.
Lemons (local), per gin case	6s. to 7s.
Mandarins (Emperors), per case	5s. to 7s.
Oranges (Maryborough), per bushel case	4s. to 7s.
Papaw Apples, per case	2s. to 3s.
Passion Fruit, per case	4s. to 5s.
Peaches, per case	5s. to 8s.
Peanuts, per lb.	5½d.
Pears, per bushel case	7s. to 12s.
Persimmons, per half-case	2s. to 6s.
Pineapples (Queensland), common, per case	6s. 6d. to 8s. 6d.
Pineapples (Queensland), Ripley's, per case	6s. 6d. to 8s. 6d.
Pineapples (Queensland), Queen's, per case	7s. to 10s.
Quinces, per gin case	3s. 6d. to 5s.
Tomatoes, per half-case	4s. to 5s.
Cucumbers, per dozen	1s. to 1s. 3d.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	JUNE. Prices.
Apples (Eating), per case	3s to 9s.
Apples (Cooking), per case	8s. to 10s.
Apricots, per case	
Bananas (Cavendish), per dozen	3d. to 4d.
Bananas (Sugar), per dozen	2½d. to 3½d.
Cape Gooseberries, per case	5s. to 8s.
Cherries, per quarter-case	...
Citrons, per cwt.	12s.
Custard Apples, per quarter-case	5s. to 6s. 6d.
Grapes, per lb.	...
Lemons (Italian), per case	...
Lemons, per case	5s. to 6s.
Mandarins, per case	4s. to 6s.
Mangoes, per case	...
Nectarines, per quarter-case	...
Oranges (Navel), per case	7s. 6d. to 9s.
Oranges (Other), per case	3s. to 4s. 6d.
Papaw Apples, per quarter-case	1s to 2s.
Passion Fruit, per quarter case	5s. to 7s.
Peaches, per quarter-case	...
Peanuts, per lb.	2½d.
Pears, per case	...
Persimmons, per half-case	...
Plums, per quarter-case	
Pineapples (Ripley), per dozen	1s. 6d. to 4s. 6d.
Pineapples (Rough), per dozen	1s 6d. to 4s. 6d.
Pineapples (Smooth), per dozen	3s. 6d. to 5s. 6d.
Rockmelons, per dozen	...
Rosellas, per quarter-case	...
Strawberries, per tray	3s. 6d. to 4s. 6d.
Tomatoes, per quarter-case	2s. 6d. to 5s.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, MAY, 1912.

Animal.	MAY. Prices.
Bullocks	£7 15s. to £8 17s. 6d.
Bullocks (single)	...
Cows	£5 15s. to £6 17s. 6d.
Merino Wethers	18s. 3d.
Crossbred Wethers	19s. 6d.
Merino Ewes	14s. 3d.
Crossbred Ewes	15s. 3d.
Lambs	16s.
Pigs (Baconers)	34s.
Pigs (Porkers)	25s.

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to a fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field. A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds which will begin to vigorously assert themselves as the weather gets warmer; therefore keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent planting of cuttings from the old vines, and to obtain cuttings from other districts. If grasses have not yet been sown, there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn out sugar lands in the Central and Northern districts if not intended to be manured and replanted will bear excellent crops of sisal hemp. Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnip, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them

lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2·63 in., and for September 2·07 in., increasing gradually to a rainfall of 7·69 in. in February.

Orchard Notes for August.

THE SOUTHERN COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of Citrus Fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well balanced main branches cut off at about 2 ft. from the trunk. When cut back give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they may be allowed to throw out a number of shoots, which should be thinned out to form a well balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good clean grown stocks I prefer budding.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient, but if of large size, then the best method is the side graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In selecting wood for grafting, take that of last season's growth that has good full buds and that is well-matured—avoid extra strong, or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or lesser extent.

Where necessary, quickly acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be harrowed or cultivated in; but, in the case of pines, they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as I am satisfied that the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and from this one shoot you can make any shaped vine you want. Just as

the buds of the vines begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used inst ad—viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

THE TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The Spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is thoroughly sweated, as unless the moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

THE SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got ready for Spring.

In the warmer parts, grape-pruning should be completed, and the vines should receive the Winter dressing for black spot. In the Stanthorpe district grape-pruning should be delayed as late as possible, so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping Spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds; side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, I prefer to head back and work out by budding on the young growth.

VOL. XXIX., PART 2. [AUGUST, 1912.

Registered at the General Post Office for Transmission by Post as a Newspaper.]

THE QUEENSLAND AGRICULTURAL JOURNAL,

ISSUED BY DIRECTION OF

THE HON. THE SECRETARY FOR AGRICULTURE.

EDITED BY A. J. BOYD F.R.G.S.Q.

VOL. XXIX. PART 2.

AUGUST.

By Authority:
BRISBANE: ANTHONY JAMES CUMMING, GOVERNMENT PRINTER.
1912.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXIX. AUGUST, 1912. PART 2.

Agriculture.

FARMING WITH DYNAMITE.

Since the publication of our articles on the value of dynamite as an aid to clearing land, and to subsequent agricultural operations, in the last two issues of this Journal, judging by the numerous letters we have received from farmers and fruit-growers seeking further information on the subject, much interest—we might almost say enthusiasm—has been aroused in many parts of the State in connection with the use of dynamite on the land. There is an impression that this method of clearing and breaking up land is of very recent origin, but this is far from being the case. It is a thorough and now well-established scientific principle for preparing the ground for crops. Some of the farmers in the Western United States of America have regularly blasted their ground for the past twenty and thirty years, and their bumper crops have always been envied by their neighbours, situated upon perhaps finer soil, but who are content with the general ploughing methods. Coming nearer home, we find that dynamite has been regularly used by Mr. Howard, at Indooroopilly, for the past eight years, with most satisfactory results.

"The World's Work" for April, 1912, has a very excellent explanatory article on the subject, from which we extract the following items:—

PRINCIPLES OF THE IDEA.

Farming by dynamite has, in fact, grasped the United States, and is spreading through Canada and Mexico like a prairie fire. The farmers

who have tried it swear by it, and are upheld by the leading authorities in agricultural science. It seems a strange way of making the ground bring forth its produce in plenty, but there is no getting away from the fact that it acts.

Doubtless the man who tried the trick first and met with success was quite in the dark as to why it succeeded. It is a moot point whether he served his purpose further than that it worked admirably. Yet, as a matter of fact, he was achieving the very best result he ever could aspire to accomplish. The soil had become hard through various causes, and the water was unable to percolate to dissolve the food upon which the plant flourishes. The plough breaks up the top surface so that the water can mingle and dissolve the plant nutriment to the depth of a few inches. The subsoil, however, is left just as intact, and the roots of the crops have to feed upon what they can draw from the land broken up by the plough. The ingenious "Hayseed" who, in desperation, had recourse to dynamite and buried it in holes drilled in the hard soil, broke the ground up into small pieces for a depth of several feet, letting in the water, which dissolved the essential nutriment, while the roots were able to descend to a greater depth, and were able to secure their fill of food. Then, again, being given facilities to extend directly downwards, the roots do not grow laterally and invade each other's feeding area, as is the case when there is only a top shallow layer of porous soil.

When news of this method of breaking up the ground first leaked out, it was received with considerable derision among the sceptical, but the agricultural specialist realised that there was method in the backwoodman's apparent madness. The experimental farms tested the matter for themselves and found that there was a decided difference in a plot of ground, one-half of which had been blasted, and the other had been ploughed in the usual manner, when sown with seed from one harvest. The blasted ground was found to produce crops running from 50 per cent. upwards in superiority and yield.

This clinched the argument in favour of dynamite farming, but then another difficulty arose. Dynamite is a peculiar tool with which to pursue agricultural operations. It must be handled in a certain manner, must not be subjected to violent extremes of temperature, freezes quickly—in fact, was just the implement which the average farmer should not use unless the death rate was to be sent up.

CHEMIST TO THE RESCUE.

Contemporaneously with the experiments of the Government agricultural experimenters, the chemists in the Wilmington laboratories of the E. I. Dupont de Nemours Powder Company were hard at work. The dynamite which the ordinary blaster used for removing rocks to admit of the building of railways, harbours, mining, and other works, was all very well, but it demanded the services of an accomplished hand. Accordingly, the chemists sought to prepare a special dynamite, suited to farm use, and which would be far safer to handle. Their efforts, at last, were crowned by success, and the "Red Cross" dynamite to-day, through the length and breadth of the continent, is regarded as the

agriculturist's most faithful and reliable friend. It was found possible to evolve an explosive of this character which does not freeze so readily as ordinary dynamite, and, altogether, is perfectly safe to handle so long as common sense is displayed.

The sticks are carefully prepared and the instructions issued are of such a character that the best results are obtained with the minimum expenditure of explosives. The soil must not be pulverised into powder, but is gently shattered in all directions, so that, for a depth of about 8 feet, it is loosened and disintegrated. The method is exceedingly simple. A long auger drills a hole vertically into the ground. The stick or cartridge, carrying its length of fuse, which projects a few feet above the ground, is then slipped in. (We note that no mention is made of the use of a detonator.—Ed. "Q.A.J.") The hole is now filled up with soil, which is rammed down tightly by the aid of a wooden stick. Then the fuse is lighted, and one and all retire until the blast has done its work. The system has come into extensive vogue for ploughing fields deeply. The men advance one behind the other in rows so many feet apart, and, at regular intervals, the charges are tamped home. When the cartridges have been laid, the men proceed across the field in a line, one to each row, lighting the fuses as they move forward. Before they have proceeded half-way across the tract, the charges first fired go off, sending a plume of earth into the air. From the side of the field the sight is somewhat uncanny, as the land seems to be undergoing some violent subterranean disturbance, bursting into big waves of dirt and smoke as the charges ignite in rows one after the other. When the field has been treated in this manner, the plough is run over in the usual way and the crops are sown.

STUMP CLEARING.

Not only has dynamite farming enabled large tracts of land formerly considered to be unfit for agriculture, owing to the hard nature of the soil, to be brought under cultivation with complete success, but it has facilitated the task of the homesteader in his clearing operations. No longer are the stumps of the biggest trees as difficult to extract as well-rooted molars; no longer is there any need to hoist a chain and hook around the obstacle, and then to pull it out by sheer force by means of a team of horses; there is no need to burn it out. The homesteader, with his auger, drills a slanting hole through the root of the tree (under the root? See diagram in the June issue of the Journal.—Ed. "Q.A.J.") from the surface, inserts the stick of dynamite, plugs up the hole with his tamping stick, and then fires the fuse. The stump, in a few seconds, is sent sky high, torn to shreds, to fall a dishevelled mass on the ground, the splintered wood afterwards being collected at leisure to be piled into heaps and burned. (See "Q.A.J." for February, 1902, and May, 1908.—Ed. "Q.A.J.") In clearing the land in this manner, the homesteader performs two useful operations. He clears the roots out of his way with the minimum of trouble and expense and breaks up the subsoil thoroughly, letting in water and air, so that he reaps a good harvest from his first sowing.

Similarly, the farmer who concludes that his land will be benefited if he can give it more water, does not go to enormous expense in digging irrigation ditches by means of steam shovels, picks, and wheelbarrows. Gangs of men, three or four in a wide row, advance over the line the ditch is intended to take. The front company drills the holes, that behind slips in the cartridges and tamps them home. In this case, the fuses are joined together, and a hundred or more cartridges are fired simultaneously. When the charging is completed, the men retire to a safe distance, the blaster observes that the coast is clear, gives his electric machine handle a strong drive home, and the next instant a serrated wall of earth and smoke towers into the air like a row of geysers.* When the turmoil has subsided, lo! there is a ditch torn out bodily, following a well-defined line, and often, by the time the men reach the banks, the channel is nearly filled with water.

So far as clearing is concerned, when the timber is useless, the farmer does not often trouble to axe down the trunks. He blows the whole tree bodily out of the ground to topple over on one side,* when it may be lopped up, or pulled along with others into a heap and fired.

EFFICIENCY AND ECONOMY.

The method is not expensive, and that is its great recommendation. One man can do the whole job if required. Of course, the cost varies according to the character of the stump to be removed; a small jack-pine stump, 20 inches in diameter, is not so refractory as a big Californian redwood about 8 feet across. In the first case, the total expense will be about 8d., while in the latter 8s. will probably be nearer the figure, this including everything—wages, dynamite, and cost of disposing of the *débris*. In each case, however, the stump will be pulled out completely in one blast. It is merely a question of more bore holes and charges for the huge redwood, but it will be sent sky-high in smithereens as completely as the insignificant jack-pine stump.

It must not be thought that this method of farming is a mere passing fad. It is a thorough, well-established, scientific principle for preparing the ground for crops, and has been in use, as stated, for the past twenty and thirty years by farmers in the West (U.S.A.).

It has also proved a means of renovating exhausted or worn-out ground whereon the crops have been raised until the soil has been drained of its nourishment near the surface.

Fertilisers may be used, but their benefits are of short duration. Yet, 3 feet below the surface the soil is every whit as good as was that formerly on the top, only the roots cannot get into it to absorb the elements which they like. A few pounds of dynamite, loosening this compact, hard subsoil, will do far more good, at an expense of £2 or £3 per acre, than tons of manure, as results have proved.

* For blasting stumps simultaneously, see "Q.A. Journal" for May, 1908.

PLANTING FRUIT TREES WITH DYNAMITE.

Possibly, what at first sight appears to be the strangest application of dynamite is for the purpose of planting trees. Yet its success in this connection is peculiarly remarkable. When a hole is made with a spade, the surrounding soil is left in its hard condition. The result is that the roots find it difficult to start. They are cramped in the tight quarters of the hole, and cannot pierce the hard wall of earth. Under these circumstances, growth is appreciably retarded for a considerable time. With dynamite, a large clean hole is blasted out, and in addition the soil on all sides is loosened for 5 or 6 feet. When the tree is planted, the young and tender roots force their way without effort through the crevices, sucking up nourishment, and commence to grow from the moment they are set, without any retardation whatever.

One lady fruit-grower in Oregon has tried both methods of planting and is enthusiastic in her appreciation of the dynamite system. She has every cause for this satisfaction, too. The trees planted in the dynamited holes grow twice as quickly as those set in the usual spade holes, and the difference between the two systems with trees of the same age set side by side is very marked. In this case, the orchard is set out with stakes, each indicating the position of a tree. One man first removes a spadeful of earth from about the stake, this being used subsequently for filling up the hole when the tree is planted. He is followed by a second man, armed with a crowbar and dynamite. He withdraws the stake, inserts the crowbar, and extends the depth of the hole until it is about 18 inches below the surface, boring his way through all hard material such as clay. The stick of "Red Cross" is dropped in, tamped home, and several shovelfuls of earth are thrown on top and trodden down around the projecting fuse. A clean hole is produced by the explosion, the greater force of which has been expended downwards through the subsoil, and shattering it. The hole is permitted to stand over night, and the next day the tree is planted. This lady was so impressed with the success of the method and the stronger and more luxuriant growth of the trees planted in this manner, that over thirty acres of orchard were planted with dynamite. In fact, she has become so wedded to the system that she broke sticks of dynamite in halves, and used a moiety for each tree of a rose bed, as well as planting the perennials in her flower borders in the same way. In every instance the end has more than justified the means, although, as she relates, her soil is a rich loam extending to a depth of 6 feet.

A NEW PROFESSION.

The agricultural colleges and experimental stations are firmly convinced of the superiority of dynamite farming and are advocating its adoption strenuously. The experimental grounds are treated in this manner, besides other stretches cultivated on the usual lines, and sown with seed from the same stock. The superior results accruing from the former treatment are quite readily apparent even to the most unpractised eye. Dynamite farming has also given birth to a new profession. Many farmers regard this explosive with suspicion. They are afraid

that their ignorance will prompt the stick to turn on them with disastrous results. So a keen demand has arisen for expert dynamite farmers—men skilled in the handling of the agent, and ready to do anything, from blasting out stumps, subsoil ploughing by this means, cutting irrigation ditches, blasting holes for fruit trees, posts, and what not. The men are trained thoroughly in the requirements of the art, and have found that dynamite farming, from their point of view, is a highly remunerative, albeit unique calling.

Still, the ordinary farmer, provided he follows the directions set out extensively and clearly, need apprehend no danger from the employment of this implement. Dynamite is by no means such a dangerous agent as popular conception imagines. It can be handled as easily as petrol or matches, and, like these two articles, only turns on the user when submitted to indignities. A little practice and the observance of results achieved soon enable one to become expert in this application, so that the necessity for a professional dynamite farmer may be dispensed with.

In the Southern States where cotton is the staple product, dynamite farming has worked wonders. By ploughing deeply into the soil by the aid of the explosive, dry weather no longer inflicts widespread damage. The streams may run dry and the lakes become empty, but the cotton roots, having penetrated deeply into the soil, are able to obtain a sufficiency of moisture under the most trying climatic conditions. Indeed, the use of dynamite is proving the salvation of the cotton country, and every year the number of farms which are being ploughed in this way is increasing by thousands.

It must not be thought that dynamiting obviates the necessity of top ploughing. Far from it. The plough must be used just as much as ever. The only thing is, that the dynamite expends its disintegrating force in the subsoil, which is never touched by the plough, so that one is not merely planting the crops in the same soil year after year, and only enabled to maintain the yield by recourse to expensive fertilisation. Even in orchards stocked with old trees the method can be practised to distinct advantage. If small charges are fired under them, or between the rows, the ground is broken up, to form a spongy reservoir for moisture, while the explosive spells instant death to all harmful grubs. Then, again, swampy ground can be improved by the intelligent expenditure of a few pounds of the explosive. In many cases this result arises because the clay subsoil forms a water seal, and the surface moisture cannot drain away. By breaking up the clay strata the water is afforded an opportunity to escape by percolating through the clay, and dissolving the elements for plant life contained therein. One farmer in Kansas was handicapped for years by a swamp extending over forty acres on his farm. At last he decided to test the efficiency of blasting a row of holes across the lowest part of the swamp, where the collected water was about 3 feet deep. The result was astonishing. The water sank into the ground, and ever since, that forty acres, which was a nightmare to the owner, has produced four crops of alfalfa (lucerne) every year.

THE USE OF EXPLOSIVES IN CLEARING LAND.

Professor H. L. Russell, Director of the Agricultural Experiment Station, University of Wisconsin, in an explanatory note to Bulletin 216, November, 1911, issued by the University, and written by J. F. Kadonsky, says:—"The magnitude of this work of stump removal may be recognised when it is considered that, as yet, but from one-half to 5 per cent. of the area of many of our northern counties is now under cultivation. The problem is pressing, not only in the forested region of this State, but is equally important in Northern Minnesota and Michigan." Referring to the Bulletin mentioned he says:—"The studies here outlined have been confined to but one aspect of the problem—viz., the use of explosives, and represent work which has been undertaken co-operatively between this station, the Office of Farm Management of the United States Department of Agriculture, and the North-east Experiment Farm of the University of Minnesota."

We are receiving so many letters on this important subject that we think it will save much correspondence betwen farmers and the Queensland Department of Agriculture and Stock if we publish Mr. Kadonsky's Bulletin, in addition to what we have already done in this direction in this Journal. It needs but little travel through the agricultural districts of the State to convince anyone that there is just as urgent need for a cheap and effective method of clearing forest lands of stumps as there is in the United States, seeing that there are everywhere large areas of good forest land in all parts of the State which could be brought under profitable tillage by the use of explosives, but which cannot now be utilised, owing to the great expense of getting rid of the stumps by hand or machine labour, and of subsequent sub-soiling and draining.

"Explosives," says Mr. Kadonsky, "are used extensively in clearing new land in Wisconsin and Minnesota, especially in the regions with clay soils, once heavily timbered with pine. Explosives are now handled in many different ways, and there is great necessity of systematising and describing the best method of clearing lands by their aid. These explosives are used to extract stumps by breaking them to pieces and also to remove boulders. They may also play an important part in splitting and jarring off the soil from the roots in connection with mechanical power pulling stumps. The advantage of using explosives in clearing new land is, that a big investment is not necessary, as in the case of stumping machinery. Explosives can be used in some way by almost every settler. The stumps and boulders are left in such form as to be handled easily and disposed of. The roots are freed from soil, and the large parts so broken up that they may be used for fuel, as is the practice in many sections at present."

An explosion is the sudden transformation of a solid into a gas, which occupies a greater space. A common error is made by many practical men in thinking that the action of dynamite is downward, rather than being equal in all directions. It appears to act downward from the shattering effect on the soil or boulder, but the action upward is

just as great, only there is usually nothing visible to show it. The action on the soil chemically is not detrimental, as is commonly believed, but would rather tend to improve fertility.

KINDS OF EXPLOSIVES.

Two common kinds of explosives used in Wisconsin and Minnesota are dynamite and "virite." The dynamite ranges from 20 per cent. to 60 per cent. in strength, but the most universally used is 40 per cent. The 60 per cent. "straight" acts very rapidly with a shattering effect, while the 25 per cent. "extra" acts comparatively slowly with a propelling force. "Virite" is of only one strength, equal to 40 per cent. dynamite, as determined in the field, but much slower in action. The higher the strength, the speedier and more sensitive the dynamite. Those grades marked " extra" are slower in action, and should be used where a propelling force is desired.

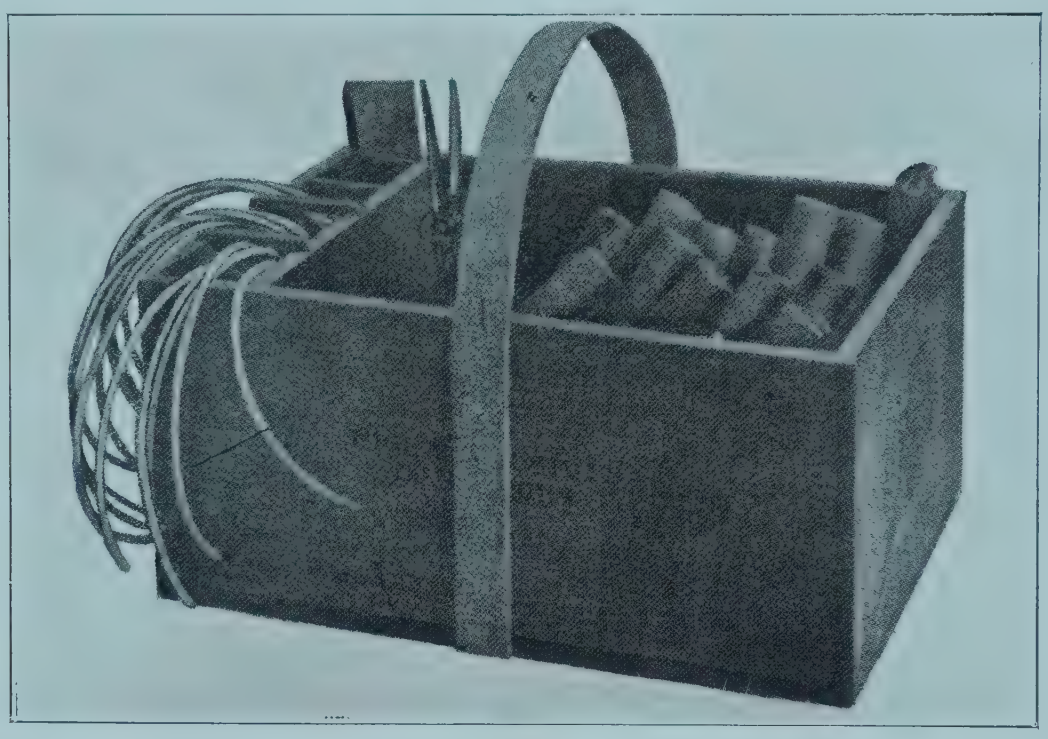

FIG. 1.—A handy box for carrying explosives, fuses, and caps. Compartments in one end provide for the caps and fuses.

It is very important to have the different grades of dynamite where shattering and propelling forces are required. In raising a boulder or a stump, a slow propelling force is best, but for breaking rocks or stumps, a speedy shattering force is necessary. Dynamite freezes easily, and when in that condition should be handled very carefully. When it is left in the hot sun during the summer it is rendered much more sensitive, and requires more precautions in working with it. The effects of the odour, or contact with dynamite, causes many operators to become sick. If a pair of canvas gloves is used in holding the cartridges, they can be discarded when they become saturated. Breathing the smoke or fumes should be entirely avoided.

Virite is comparatively more stable than dynamite. The latter can be almost always exploded by a ball from a rifle, while the virite would

remain intact. Virite is put up in bulk or cartridge form, and is non-freezing, and, consequently, can be used in the coldest climate without thawing. It has no odour which affects the operator, as in the case of dynamite, but the powder cannot be used in water unless confined in water-proof cartridges.

Handling Explosives.

Following is the equipment needed for blasting in the field:—A supply box, auger, crowbar, shovel, wooden ramrod, and a cap crimper. A supply box can be made on the farm by taking an empty dynamite box and placing a vertical partition across one end, leaving a space the width of an explosive cap box. At one end of this, make a compartment that will just admit a box of caps. The remainder of the space can be divided equally by ½-in. cross pieces, and each section *labelled* 18 *inches,* 20 *inches,* and 24 *inches,* respectively. The remainder of the box is used for explosives. Care should always be taken to keep the caps separated from the explosives. A wooden hoop may be nailed over this box for a handle, so that it balances when filled with supplies. (See Fig. 1.)

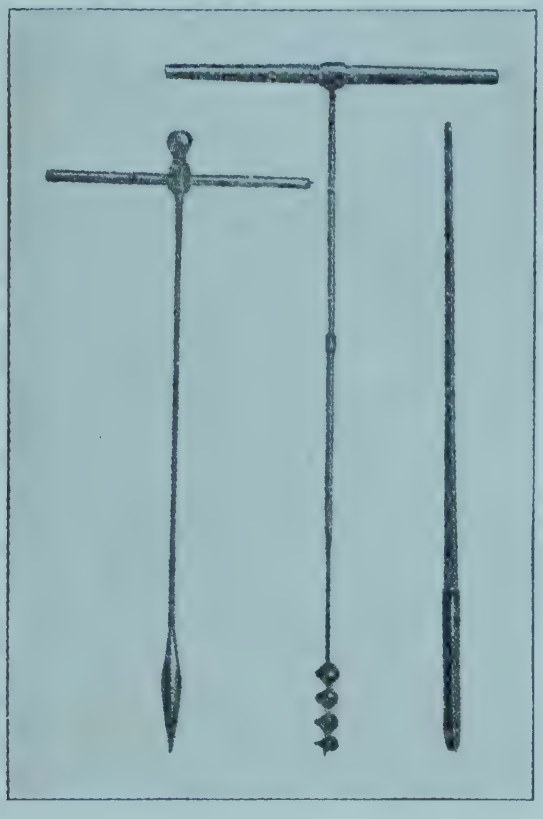

Fig. 2.—Three essential tools for preparing holes under stumps for blasting; large soil auger in the centre, a crowbar at the right and a pick at the left for opening a hole under the stump. Each is an important labour-saving device in placing explosives properly.

A convenient auger is made by welding a long shank into an ordinary 2-in. auger. Where the roots are not too numerous, and admit a larger auger, it would be advisable to use it. A medium-sized tapering crowbar should be used. The larger end should be drawn to an edge, and the other end to a blunt point. The ramrod can be made from an ordinary broom handle, and should be at least 3½ ft. long. These tools are shown in Figure 2.

A round-pointed shovel is best for removing the soil from the roots when loading and in filling in the hole when tamping the charge. A long tin funnel should be used to pour the virite, when in bulk, under the stump.

For making holes in the dynamite to receive the cap, a tapering hardwood stick, just a trifle smaller than the diameter of the cap, can be used. Attach this stick to a cord fastened to a trouser button where it will not be lost. Where the stumps are of uniform diameter, it is well to prepare the fuse of certain lengths before going into the field. Cut the fuse with a hand axe by laying it on a block on which a board is

nailed horizontally, and marked the desired lengths. We also carry with us a roll of fuse, which is cut in the field to meet exceptional cases. There are a good many ways of handling this fuse. Some people blast with only about 6-in. fuse, no matter how long the hole is, by lighting the short fuse, and dropping the dynamite on the rest of the charge, thus exploding without tamping. I do not approve of this method.

The end of the fuse should be cut square, not on a slant. If cut slantwise, the point, becoming dry and hard, is likely to explode the cap when inserted into it, or this point is likely to turn over in the cap and cause a misfire. The fuses are then inserted into the caps, and crimped with a crimper. Care should be taken that each cap is free from any foreign matter, since this will serve as a protection to the fire from the fuse and cause a misfire. The fuse should not be inserted into the cap too far, and should never touch the bottom, since this is very sensitive and may cause an explosion. When the end of the fuse enters the cap, and is crimped so that it just holds and withstands a reasonable amount of pulling during the process of tamping the charge, it is sufficient. The fulminate in the cap is so sensitive that it is exploded by the fire from the fuse when the end is nearly 1 in. outside the opening of the cap, if the fuse be directed into it. Do not expect the fuse to burn like a fire-cracker fuse. It is lit as soon as it gives a little spit of fire in answer to the match, but the outside cover of the fuse does not burn. Always retreat at least 100 ft. after lighting the fuse, until the charge explodes. Instances have been brought to my attention where the fuse was lit in the morning and hung fire all forenoon, and exploded about 11 o'clock.

PLACING THE CHARGE.

In blasting a stump, the charge is always placed *under* it in the soil, and *not in the wood* of the stump. To get to the desired point, it is necessary to make a hole with an auger or crowbar between the roots into the ground at the proper angle to get the charge in the centre of resistance. The hole should be made, if possible, between two prominent extending roots which come close together, as shown in Figure 3.

There are two reasons for this. First, there is less chance for the force to blow out of the hole, due to the resistance offered by these roots. Second, owing to the root distribution, there are generally no

FIG. 3.—Charges of explosives should be placed under stumps, at the centre of resistance. Using a long-handled soil auger, the hole may be bored between two large roots into the soil, under the centre of the stump, until the centre of resistance is reached.

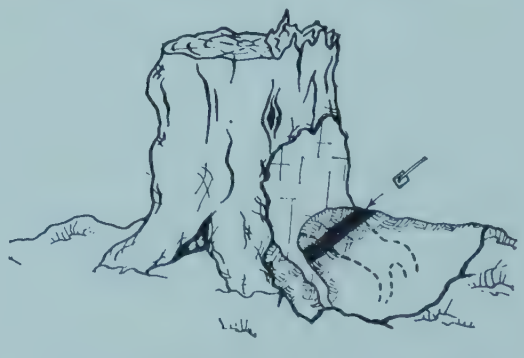

FIG. 4.—When a small root stops the progress of the auger, a small piece of dynamite with fuse attached, dropped down into the hole against this root and exploded, will remove it effectively and make it easier to complete the boring of the hole.

roots immediately behind these, and consequently less chance to meet with obstacles in making the hole.

When a hole is started and the tool meets with an obstacle in the form of a small root or stone, such a resistance can often be removed by blasting. A piece of dynamite 1 in. long is used, and in the side of the paper wrapper, two cuts at right angles are made, into which a capped fuse about 4 in. long is inserted. This charge (shown in Fig. 4), which resembles a fire-cracker to some extent, is then lit and dropped down into the hole next to the obstruction, without tamping.

The force of this small explosion generally renders conditions such that the process of boring can be continued. This charge, costing only a couple of cents, often saves an hour's work, and also enables the charge to be placed where the maximum force will be received from the explosive. When the root formation is such that it is very difficult to get a large tool under the stump, a hole can often be made by driving the small end of the crowbar down so that the point terminates where the charge should be placed. Then, take a small piece of dynamite, about 1½ in. long, crumble it up, and drop it to the bottom of the hole. Try to get all, or as much as possible, of the powder to the bottom. A small stick can be used sometimes to get it down. Next, take a capped fuse about 4 in. long, drop it down upon the powder, and light. (See Fig. 5.)

FIG. 5.—When the soil is very hard under the stump and boring difficult, break up a cartridge and pour the loose powder into the hole, as shown above. Then with a cap attached to a fuse set off this small charge to open the way for the placing of a larger charge.

When properly carried out, this explosion will make a pocket under the stump, which will admit the desired charge. Should the passage be too small or curved, so as not to allow free passage of a cartridge, it should be crumbled and the contents poured down.

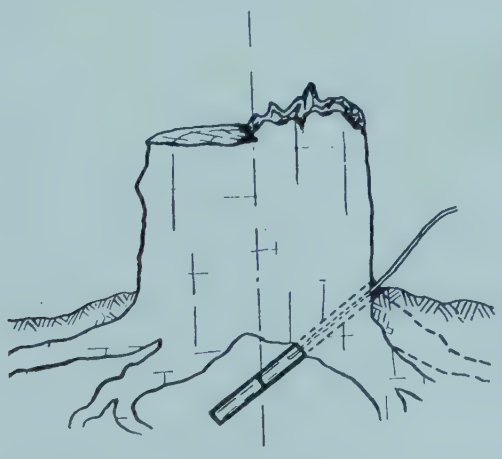

FIG. 6.—The hole should be bored past the centre of the stump sufficiently to allow the explosive to be placed across this centre as above, rather than on one side of it, as shown in Fig. 7.

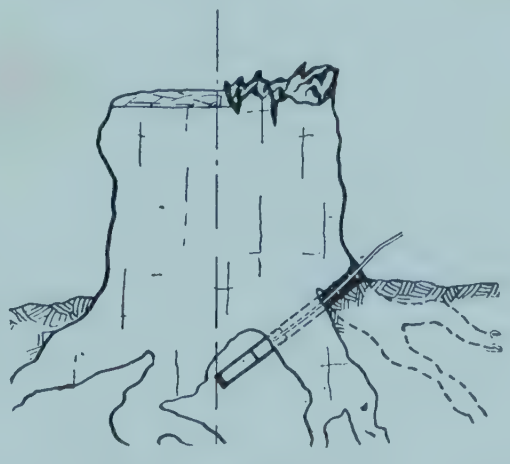

FIG. 7.—A common error in placing explosives is to bore the hole just to the centre of the stump and not beyond it. When the charge is placed at one side of the centre, it either merely blows off a part of the stump or forces away the soil at one side and does not remove the stump perfectly.

For an extremely large stump a big charge is necessary, placed in as compact form as possible. To do this, a pocket is blown at the bottom of the hole in the same manner as above in the case of removing an obstacle. Care should be taken not to get the pocket too large, so the dynamite cannot be tightly packed, which is absolutely necessary in order to get the best results. Virite, on the contrary, must have plenty of room, and must not be tamped under any circumstances. Where the dynamite cartridges are packed in the hole without breaking, leaving the explosive in a cylindrical form, the hole should be bored

FIG. 8.—The charge was not properly centred under this stump, consequently the explosion removed one side and a part of the roots, leaving the rest of the stump in bad shape for further blasting.

past the centre of resistance, equal to half the length of the charge, which brings the bulk in the centre of resistance, as shown in Fig. 6.

The common way of placing the charge is to bore a hole *under* the stump at an angle of 45 degrees, terminating it at the centre of the stump, as shown in Fig. 7. When the cartridges are pressed down unbroken, the charge is then out of the centre of resistance, and, consequently, the results are not satisfactory.

Often, when boring a hole, an obstacle is met with before reaching the centre of resistance, the operator places the charge, increasing the amount of powder, believing this will do the work as well as when properly placed. This, however, is not the case. The side of the stump is blown away, cutting the roots, leaving almost all of them and half of the stump behind, as shown in Fig. 8.

It is necessary to emphasise this point. Place the charge far enough under the stump, in the centre of resistance, but not always necessarily under the centre of the stump. Time is well spent in putting forth extra effort in doing so. When a stump is located on a slope, the centre of resistance and the centre of the stump are not the same; hence, when

the charge is placed under the centre of the stump, only part of it is blown out. Here the resistance is greater toward the higher slope, and, consequently, the charge must pass the centre of the stump to get it in the centre of resistance, as shown in Fig. 9.

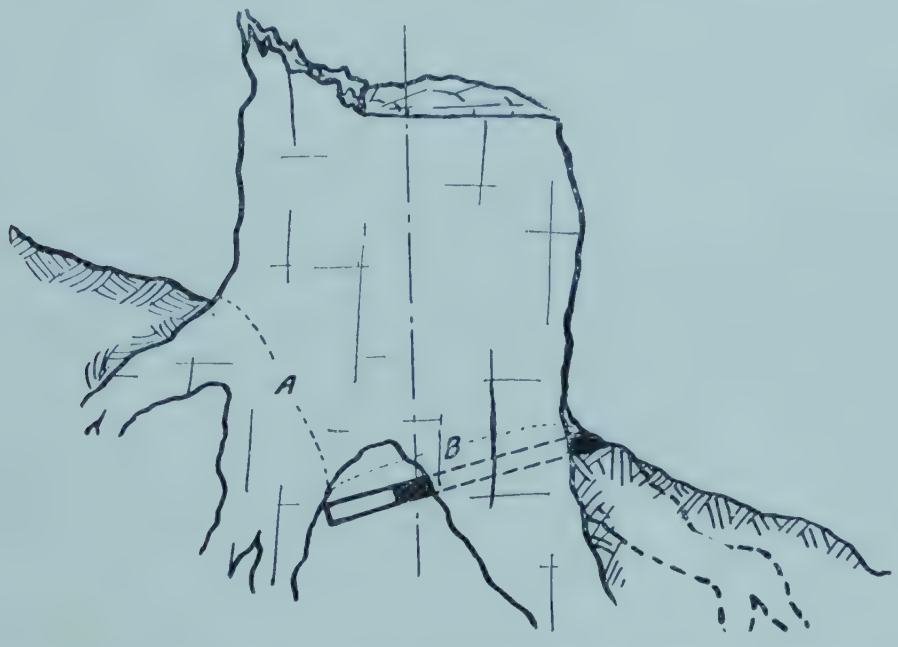

Fig. 9.—When stumps stand upon a hill side, the centre of resistance is up-hill from the centre of the stump. The distances, A and B, should be about equal, so that the charge will not blow out of the lower side of the stump.

Often the root formation is greater on one side than on the other, and when the charge is placed under the centre of the stump, the force takes the path of least resistance, shooting out at one side. (See Fig. 10.) To remedy this, place the charge over toward this heavy root formation,

Fig. 10.—An explosion of a chargei mproperly placed at one side of the centre of the stump. Note that the main force of the explosion is going out to one side.

as in Fig. 11, which will bring it in the centre of resistance, and give better results. Sometimes the nature of the soil on one side of the stump is such that it offers more resistance than that on the other, which must also be taken into consideration when blasting.

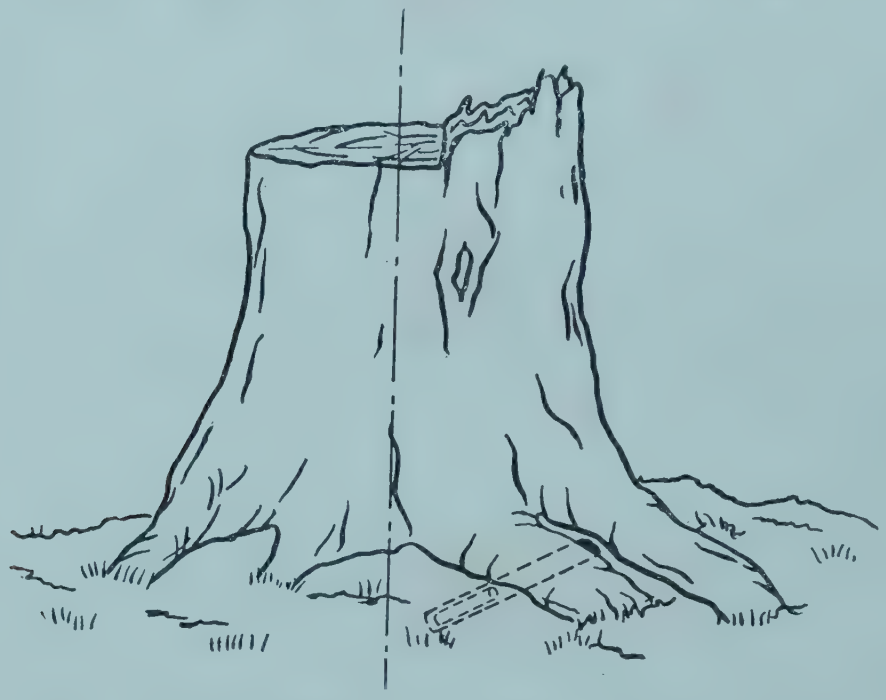

FIG. 11.—When a stump has unusually large roots on one side, a charge of explosive should be placed upon the side of the centre of the stump towards these roots.

DEEP CHARGES UNNECESSARY.

The depth at which the charge should be placed is also very important, and on this point varied opinions are held by different operators. It has been found by placing a charge at a comparatively great depth, as advocated by many, that it required a greater amount of explosive, and the results obtained were not so satisfactory as when less powder

FIG. 12.—When a charge is placed too deep in clay soil below the stump the result is that the stump is merely split, as shown here. In sand, the soil is merely blown away, as shown in Figure 13. While the charge should be in the soil under the stump, it should be as close to the wood as it can be placed

was used at less depth. The cost was greater, the stump was not broken up and freed from soil, and larger holes were left to be filled, when the charge was placed deep. This is due to the fact that by placing the charge some distance in the soil below the base of the stump, a large mass of soil must be raised, which also serves as a protection to the stump. When an ordinary charge is deeply placed in a clay soil, the result is a pear-shaped hole in the soil, and a split stump through which the gases escape, like the one in Fig. 12.

Fig. 13.—When a charge is placed too deep in light sandy soil, the force of the explosive blows away the soil and leaves the stump standing as shown here.

In light sandy soil the gases tend to blow out on either side of the stump between the roots, when the charge is deep, leaving the stump in place, as in Fig. 13.

This is due to the greater ease with which the force can escape at some distance below the base of the stump, where there is a greater spread of roots than farther above. Care should also be taken not to place the explosive too shallow. If the charge is not deep enough, and the head of the stump is weak, the result is that the top of the stump is blown off, cutting and leaving the roots above the plough line, like those in Fig. 14.

Fig. 14.—When a stump has a weak top and the charge is placed too shallow, the result of the explosion is that the head of the stump is blown away, as shown here, leaving the large roots above the plough line in a position very hard to remove.

It is difficult to set any hard-and-fast rules regarding the depth at which the charge should be placed under the stump. The operator must use his judgment in each individual case, but place the explosive as shallow as possible, avoiding cutting off any part of the stump above the plough line. This will give the best and most economical results. As a rule, it is best to place the explosive in a bulk form, breaking up the cartridges, especially when blasting large stumps. The force then radiates equally from one central point, and splits the stump into the maximum number of parts. When the charge is in the cylindrical form, most of the force acts at right angles to it and generally splits the stump into two parts.

HINTS ON PLACING CHARGES.

There are a few things which should be observed about loading to save time and get the best results. When the hole for the charge is large, it is well to take the powder out of the cartridge, and tamp it well into a bulk form. The paper wrappers should also be included, since these, which are saturated with nitro-glycerine, are also explosive. The quickest and a most satisfactory way is to cut the wrapper lengthwise into four parts with a sharp knife, as shown in Fig. 15.

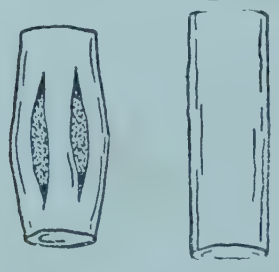

FIG. 15.—Slitting the wrapper enables the charge to be pressed compactly in the hole.

When this cut cartridge reaches the bottom of the hole, and is pressed with the ramrod, it bulges and crumples into a mass. When placed in a cylindrical hole, the cut parts bulge out so as to fill the opening completely, thus making the charge compact, which is desirable. (See Fig. 16.) Into the last part of the charge, the fuse with cap crimped on to the end should be placed. If an ordinary fuse is used a very quick and satisfactory way is to hold the cartridge in the left hand and make a hole with a pointed stick slightly smaller than the diameter of the cap in the side near one end at an angle of 30 degrees. The cap is then pressed into it so that it is buried in the powder, and the fuse bent back to form a sort of hook with the cap as a point. (See Fig. 17.) This is passed down the hole to the remainder of the charge, and the fuse can stand a reasonable amount of pulling without coming out, but rather tends to go farther into the cartridge. The cap on an electric fuse can be inserted in the same manner, but the wires should be looped round the cartridge.

FIG. 16.—When pressing the cartridge nto the hole, always use a wooden ramrod, never a metal crowbar, and press the cartridge hard enough to make it compact. The explosion will then be complete and effective.

Care should be taken not to tamp the part with the cap, but to press it gently. The other part of the charge must be tamped well if dynamite is used, but with virite it must always be left in an absolutely loose

form. The charge is generally tamped with soil, which is brought up with the tool in boring the hole, or with any loose soil which may be at hand. Always use a wooden ramrod in placing and tamping the explosives, and *never place any metallic tool down the hole near the charge under any circumstances.*

When the operator has had some experience and knows the approximate amount of explosive required for a stump, it is well to load a large number and fire them at one time. This saves time and miles of travel if one blasts all day and fires each one after loading. A good way is to load for half a day, and fire them during the noon and evening hour, when the rest of the workmen are not present.

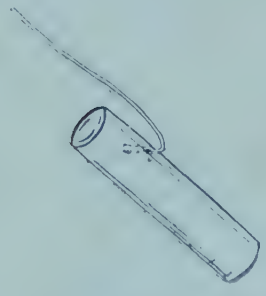

Fig. 17.—The capped end of the fuse is inserted hook-fashion into upper end of cartridge.

RELATION OF EXPLOSIVE TO SUBSOIL.

Each kind of soil requires a particular kind of explosive. It has been found that in the clay soils a slow propelling force is the most satisfactory, which is furnished in dynamite of 27 to 30 per cent. strength. This explosive, acting slowly, removes the roots without snapping them off above the plough line, leaving the soil in a comparatively loose condition, as shown in Fig. 18, which is very important from a physical standpoint.

Fig. 18.—A dynamite of moderate strength, about 27 per cent., will leave the clay soil in a loose, crumbly condition, as shown here, which is desirable rather than compacting it too much, as shown in Figure 19.

When a speedy powder is used, as 60 per cent. strength, on the clay soil it snaps many of the roots, leaving them above the plough line,

and packing the soil firmly, leaving a sort of basin, like that shown in Fig. 19.

For the light sandy soil, where the footing is not good and there is a chance for the gases to escape, a speedy force should be used, equal to 60 per cent. dynamite. The condition of the soil with respect to moisture regulates, to a great extent, the amount of explosive required per stump. Owing to a great variation in the structure of stumps, and soil conditions, it is impossible to give any definite information as to the amount of powder necessary to blast a stump of a given size. This must be regulated by the experience of the operator. Extremely loud reports and the throwing of the parts of the stump great distances is

FIG. 19.—The effect of a charge of 60 per cent. dynamite on red clay is to pack the soil solidly and to leave a large basin, which must be filled and levelled before the land can be ploughed.

an indication of an excessive use of explosives. A deadened report following the explosion, the splitting and lifting of the stump just out of the ground, shows the most economical use of the explosive.

METHOD OF FIRING CHARGES.

The most common way is to split the end of the fuse to expose the powder, which is lit with a match. Some place a pinch of dynamite on the end of the fuse. The quickest and most satisfactory way when matches are used is to thrust the head of a safety match, whose chemical part is just starting to burn, into the end of the fuse. This never fails to fire, no matter how much the wind blows. It is well to scratch the match on an adjacent root or the sole of the shoe, so that the head of the match cannot burn long before being thrust into the fuse, which is very important in this method. Where a large number of

stumps are to be fired at once, a live brand or an iron rod, 1 inch thick and about 3 feet long, heated in a burning rubbish pile, is recommended.

The safest and perhaps the best means of firing is to use an electric blasting machine for that purpose. An electric blasting machine consists of several electric dry batteries arranged in a box for convenience of carrying, and connected with a switch which must be closed in order to fire the charge. It is fitted with screw binding posts for convenience in connecting the machine into the circuit with the powder. A number of stumps close together can be fired simultaneously. The cap of the electric fuse is placed in the cartridge in the same way as the cap on the time fuse, only the wire is looped round the cartridge. The wires running to the cap should be long enough so that they will project out of the hole when the charge is tamped. Connect one of the cap-wires to a long wire running to the machine, 200 feet away. Connect the other cap-wire to an insulated wire running to the next stump, and so on through all convenient charges back to the blasting machine to complete the circuit. The method is illustrated in Fig. 20. The charges are fired by closing the switch.

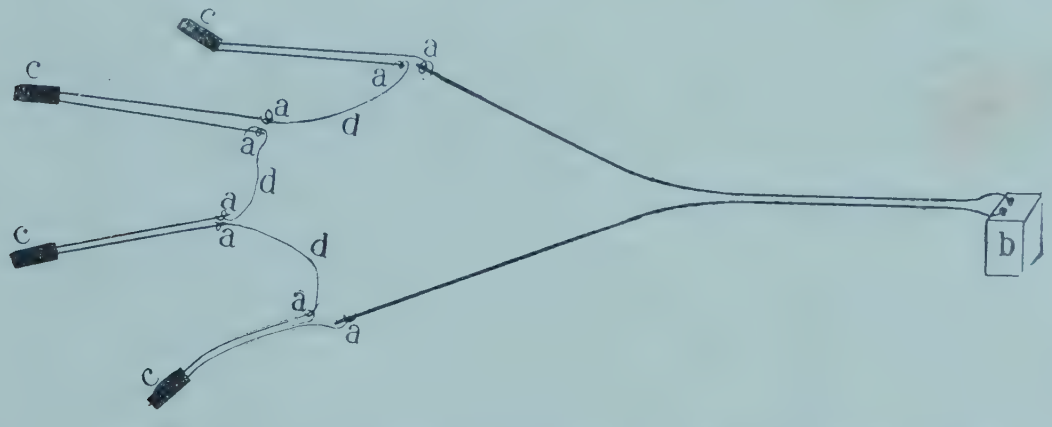

Fig. 20.—Method of blasting several stumps at once; *b* represents electric blasting machine; *c* a charge at a stump connected by the cap-wire into the circuit at *a*; *d* represents an insulated wire connecting one charge with another.

Care should always be taken to have the wires disconnected at the battery while preparing the charges. Electric firing has advantages over time fuse in that accidents are less likely to occur, the chance for misfires is reduced, and there is a saving of time by blasting a number of stumps simultaneously. Often two or more adjacent charges must be fired at once to get the best results, which is possible only by the use of electricity.

CAUSES OF MISFIRES.

Misfires are due principally to the presence of foreign material in the cap; pulling the fuse out of the cap; pulling the cap out of the powder; or to a defective fuse. Perhaps the most serious accidents occur when a time fuse burns to a certain point and then, owing to some defect, burns very slowly for a few minutes. The operator, after waiting for what he considers a long time, approaches the stump, when the explosion takes place, with serious results to himself.

A misfire should be left until one is absolutely certain that it will not explode. Do not go near it till the following day. Then it can be

treated by making a hole or removing the tamping toward the charge carefully, but not coming in contact with it. A small charge is then placed near the first, which upon exploding generally sets off the first charge.

BLASTING BOULDERS.

In blasting boulders, the aim is to throw them above the surface and break them into smaller parts, so that they can be handled easily. For raising these masses, a slow propelling force should be used. The charge should be placed under one end of the boulder, at a point where a pry would be placed if it were to be raised in this manner. A pocket for this charge can be made under the rock by means of a long-handled, pointed shovel. The explosive should come in contact with the boulder and have a flat ground surface parallel to the rock surface with which it is in contact, to work against. To break a rock on the surface, a very speedy explosive, as 60 per cent. dynamite, is most satisfactory. It can be placed on the mass and covered with wet soil. The most effective way is to get the charge into a crevice or hole in the surface of the boulder if possible.

EXAMINATION OF QUEENSLAND COTTON.

In August, 1911, the Department of Agriculture and Stock forwarded samples of Queensland cotton, supplied by Messrs. Joyce Bros., of Ipswich Cotton Mills, to the Imperial Institute for examination and report on their value. Owing to a misunderstanding, the samples were forwarded to the Glasgow Exhibition. Hence the delay in the receipt of the report, which is as follows:—

RESULTS OF THE EXAMINATION OF QUEENSLAND COTTON.

IMPERIAL INSTITUTE.

No. 40,928. Date, 24th May, 1912.

Reference.—Letter dated 17th August, 1911, from the Under Secretary of the Department of Agriculture, Brisbane.

Number or Mark and Weight of Sample.—Cotton from Queensland. Weight, unginned cotton 28 lb., ginned cotton 6 lb.

Variety of Cotton.—Not stated.

Description.—(1) Ginned, (2) unginned.

Lint.—Clean, fairly lustrous, slightly harsh, white and free from stains. Yield of lint on ginning, 34.15 per cent. Yield of lint per 100 seeds, 7.0 grams.

Seeds.—Fairly large, smooth, brown seeds, each bearing a tuft of down, and a spike at the pointed end.

Strength.—Poor.

Length of Fibres.—From 0.7 to 1.3 inch; mostly from 0.9 to 1.1 inch.

Diameter of Fibres.—From 0.0006 to 0.0011 inch; average, 0.00082 inch.

Microscopical Characters.—Most of the fibres exhibited a good twist.

Commercial Valuation.—From 6.80d. to 6.90d. per lb., ginned, with "middling" American at 6.46d. per lb.

Remarks.—This cotton was of good colour, rather harsh and coarse, and decidedly weak. It was classed by the brokers as of "barely good middling grade."

THE FARMERS' SHEEP.

By W. G. BROWN, Sheep and Wool Expert.

Twenty-five years ago the pastoralist, pure and simple, was supreme on the Darling Downs, and the farmer had a hard struggle to make ends meet, if he stayed on his holding. He was, therefore, forced to go away to seek a living at shearing, fencing, dam-sinking, &c., on the big holdings of the Downs and the West. With few exceptions, the flocks consisted of merinos; and wool-growing was the primary consideration.

In the natural course, increased and increasing population caused land values to rise, and coincident with that process, prices for fine wool and stock fell so low that the pastoralist found it difficult to make ends meet.

It may be postulated that when land rises in value above £2 per acre it does not pay the holder, even at the present high prices, to graze sheep on natural grasses.

Suffering at each end of the wool-growing business, therefore, the pastoralist was forced to cut up his big estate—it was inevitable—and the number of farmers increased by leaps and bounds. At first, these subdivisions were run on purely agricultural lines, and in the majority of cases it was found to be a very precarious business. With the advent of dairying, however, everything was changed, and the farmer began to thrive as he had never thriven before. One consequence was that he and his sons, instead of going out to the shearing-sheds, and other pastoral work, remained at home, and, in time, the children acquired land themselves, and went in for the dairying business. Thus a bigger demand for land than ever was produced, the process being helped by the advent of the New Zealanders and the Southerners. As a consequence, values have risen, until to-day it is safe to say that arable land in the farming districts is at least five times more expensive than, say, twenty years ago, and the process is still going on.

All countries, in their turn, have been forced to face the problem of how best to deal with land when they have passed the purely hunting and pastoral stage, and as far as the coastal districts are concerned, Queensland is now face to face with it. In Britain, the question was solved 150 years ago; America followed suit within the past thirty years; the Southern States of the Commonwealth about fifteen years ago, and New Zealand somewhat earlier than Australia. The answer to

the question of how to deal with high-priced land to the best advantage is—"mixed farming," cultivation—with stock. In Britain there are more sheep than Queensland possesses, although there is a difference of 35,000,000 in population, on an area, in Britain's case, of less than one-tenth of that of Queensland. In New Zealand, mixed farming is carried on successfully by farmers who have paid upwards of £40 per acre for their land, and a similar state of affairs prevails in Victoria and South Australia. It is plain that Queensland farmers must follow their lead on the land which is yearly increasing in value, and it is the aim of these articles to point out what has been done elsewhere, with the modifications which our differing conditions require.

Well, then—supposing a Queensland farmer decides to take up mixed farming. What shall he do? He may dairy; he may breed horses or beef cattle; he may breed pigs or sheep.

With dairying he must keep pigs; horses and cattle together will do well; sheep and cattle do not do well together.

The choice will depend, of course, upon the man. With dairying, horses, pigs, or cattle these articles have nothing to do. It is to the sheep-farmer or the would-be sheep-farmer they are addressed.

Fortunately for the sheep-farmer, there is a vast fund of theoretical and practical knowledge to draw upon. For over 150 years the Britishers have been working their land, as "mixed farms"; the New Zealanders and the Southern States have been exporting millions of fat sheep and lambs for many years, have been working along every conceivable line of breeding and feeding, and have practically reached perfection. All the results are on record, and it seems as if four questions stand out, as thus:—

1st: What kind of sheep is most suitable?
2nd: What shall they be fed upon?
3rd: How shall they be handled?
4th: What should be the result financially?

First: What kind of sheep is most suitable?

According to Professor Bowman, in his "Structure of the Wool Fibre," there are eleven varieties of sheep known, with thirty-nine sub-varieties, but experience has shown that of all these, not more than a dozen show qualities which would recommend them to Australians or New Zealanders. Of these about nine are well known, and these are divided into three classes, viz.:—

Merino Long-wools Short-wooled or Downs' breed.

We shall take them in the order given, first stating the qualifications necessary to excellence in a farmer's sheep.

It should be a dual-purpose animal. That is, it should be bred primarily for mutton, with as valuable a fleece as possible.

It should mature as early as possible.

It must be strong in constitution.

It must be prolific.

The merino is the first, and, to Australians, the most important. In its pure state it is distinctly not a farmer's sheep. It is essentially a wool-producer, carcass being secondary to fleece, and, as stated above, the farmer's sheep should be bred primarily for mutton. It is the slowest in maturing of any breed, and is a dainty feeder, doing ill on feed upon which the British breeds will flourish. A farmer's sheep should be a gross feeder. On rich country, with an abundant rainfall, it does ill. Yet, because of its beautiful wool, and its power to transmit fleece quality to the cross with any other breed, it is essential in the production of the dual-purpose sheep. One parent in any cross-bred sheep must be Merino, whatever other be used. That fact is beyond argument now in Australia.

Next come the long-wools. There are four main breeds of these:—

The Lincoln, The English or New Leicester, The Border Leicester, The Rowney Marsh.

The Lincoln.

Like the Merino, the Lincoln has a history whose beginnings go back into very ancient times. It has a big body, with big head, big bones, big fleece with coarse fibre, yet a true wool, with great relative length of staple. It is not as early a maturing animal as others of the British breeds, but, as compensation, carries its vigour into an age when most others are decrepit and valueless. For wool and mutton the first cross on the Merino has come to be recognised as being one of the best.

The "Australasian," of Victoria, recently issued a series of questions to the leading sheep-farmers of Victoria, asking for opinions on matters pertaining to mixed farming. Thirty-one replies were received, and in three of them—What is the best breed for (*a*) wool-growing, (*b*) lamb-raising, (*c*) for wool and lambs?—Lincoln received twenty votes, while the remaining eleven votes were spread over six other breeds. In the case of using Lincolns, it was a condition in most of the verdicts for that breed that a big, plain-bodied, Merino ewe should be used as the mother.

The Leicester.

The Leicester, properly called the New or English Leicester, is, in figure, hardihood, and quality, both for wool and mutton, almost unrivalled. It originated about 100 years ago with a Mr. Bakewell, who obtained it by judicious selection of various long-woolled sheep and the old Leicester breed, which is now nearly extinct. As compared with the Lincoln, its skin is soft, thin, and elastic, with a fair quantity of white lustrous wool, finer than other long wools, although not as long as they. The Leicester is noted for a greater proportion of dead to live weight than any other breed.

Fine hair and fine bone in any animal presupposes fine constitution, therefore this breed is not as robust as its coarser-organised rival, the Lincoln, and is more dainty in its choice of feed. It matures much earlier than the Lincoln, and is very prolific.

(TO BE CONTINUED.)

BOYS' POTATO CLUBS.

In the United States of America, every incentive is given to young people in the rural districts to enter upon a course of practical agriculture on their own initiative. One of the popular institutions, particularly in Utah, is an organisation of boys into clubs, the members of which vie with each other in the production of crops of various kinds. The great value of these clubs lies in the preparation of young people on their parents' farms for a future successful career in agricultural pursuits

Amongst these clubs are the "Boys' Potato Clubs," which have proved eminently successful, in the same way as do similar "Corn Clubs" in the Eastern States.

We have just received from the Utah Agricultural College Experiment Station, a circular (No. 5, Extension Division) giving details of the constitution of these clubs, together with instruction in potato-growing. The conditions under which the cultivation of the potato is carried on in the Western States naturally differ from those under which the tuber is grown in Queensland, where two crops are harvested annually, and where "freezing" conditions are practically unknown, although frosts occur during the winter season.

The institution of boys' clubs should commend itself to our boys, seeing that the State school teachers are all trained yearly at the Queensland Agricultural College, at Gatton, when they study not only agriculture, but dairying, stock-raising, &c. The knowledge thus gained is imparted to their scholars, and at nearly all the country State schools there are scholars' gardens, where the boys and girls very successfully put into practice what they learn from their teachers. Following is

THE CONSTITUTION

of the Boys' Potato Clubs in the State of Utah:—

CONSTITUTION.

Article I.—Name of club.

Article II.—Object of club.

Article III.—Membership (including badge or button, and a provision for honorary member, if desired).

Article IV.—Officers: (A president, one vice-president from each school district, a secretary-treasurer, and an advisory committee consisting of the county school superintendent, the president of the County Farmers' Club, and a member of the staff of the Agricultural College Extension Division.)

Article V.—Duties of members. (As described in the rules for contests.)

Article VI.—Duties of officers. (Defined as usual in such organisations.)

Section.—The Advisory Committee shall arrange for all public contests and exhibits, the procuring and forwarding of prizes, the sending of letters and circulars of information and general county meetings of the club.

Article VII.—Subsidiary clubs.

Each local school having ten club members within its district may organise as a local club with its own officers, badge, local prizes, &c. Its advisory committee shall consist of the district school board and teachers, and its president shall be one of the vice-presidents of the county club.

MEMBERSHIP CARD.

I wish to join the County Club, and hereby promise to follow all the rules of membership and contests.

Age at nearest birthday Date of birth 19 .

Township:

School District:

Post Office Address:

Box No. R. F. D.

The members of a potato-growing club keep a careful record of all work done in connection with the annual contest.

HOW THE CROP WAS GROWN.

1. Grown by: School District:
2. Post Office Address:
3. Area of plat in square rods: (½ acre.)
4. Kind of soil (loam, sand, clay):
5. Kind of crop grown on it the year before:
6. Kind of crop grown on it second year before:
7. Kind and amount of manure used:
8. Cost or value of manure:
   When applied:
9. Date of ploughing:
   Hours required—Self: Horse:
   If two horses are used, count as twice the time of one horse.
10. Depth of ploughing (in inches):
11. Additional preparation of ground—
   (*a*) How many times disked: When:
   (*b*) How many times harrowed: When:
   (*c*) How otherwise prepared:
   (*d*) Total hours work of preparation—Self:
   Horse: If two horses are used, count as twice the time of one horse.
12. Kind of potatoes planted:
   Variety name:
13. Seed secured from:
14. Number of hills planted: Date: 19 .
15. Number of irrigations: Date: 19 .
   Hours worked:

HOW THE CROP WAS GROWN—*continued.*

16. How was seed cut?
17. Was seed treated for scab? How?
18. Date when first hills came up:
19. Number of hills failing to come up:
    Why?
20. Date of each cultivation and implements used:
21. Total hours cultivation—Self: Horse:
22. Dates of hoeing crop: 19 .
    Hours worked:
23. Date of blooming:
24. Date of harvest:
25. Dates of any frosts on the crop: 19 .
26. Method of harvest:
27. Number of bushels of good potatoes:
28. Number of bushels of small potatoes:
29. Diseases present:
30. Was the selecting done without any other person present:
31. Was all the work of production done by the contestant (except plowing, weighing, and hauling the crop)?
32. Total number of hours worked:
33. Total number of hours horse worked:
34. Value of own work at cents per hour, $:
35. Value of horse's work at cents per hour, $:
36. Value of ground rent for crop at per acre:
37. Value of manure used, $:
38. Value of saleable crop at cents per bushel:
39. Profit on the season's work, $:

In addition to the foregoing record, which should accompany the exhibit offered by the contestant, an essay covering the same facts in a connected description is required.

RULES FOR CONTESTANTS.

1. Each contestant is allowed to make an exhibit of best 50 lb. and best dozen tubers each year.

2. Each contestant must be regularly enrolled in the County Club before beginning work.

3. Each contestant must be either a regular student in the District or High Schools of the county, and must be under 16 years of age.

4. Each contestant for prizes must prepare his ground, plant, cultivate and irrigate all, without assistance from any other person. (He may have assistance in ploughing, manuring, and hauling crop, and should have in weighing it.)

5. Each contestant must study the score card.

6. Each contestant shall write an essay of not more than 1,000 words, and must carefully fill the blanks on "How the crop was grown."

7. Each contestant's record and essay must be endorsed, with his exhibit, by his principal as evidence of confidence that it is all the product of his own work.

8. The following instructions will be useful in making selection of potatoes for the contest, and for exhibition purposes.

SCORE CARD FOR POTATOES.

Variety Name	Value.	Score.
Uniformity of Exhibit	20	
Trueness of Type	10	
Shape of Tuber	15	
Size of Tuber	15	
Eyes	5	
Skin	5	
Texture of Tuber	5	
Soundness	10	
Freedom from Blemishes	15	
Total	100	

Contestant's Name _____

Date _____

Explanation of Score Card.

Uniformity of Exhibit.—Select twelve potatoes that are uniform in size, colour, shape, and which have uniformly well-defined eyes of the same depth, also as nearly as you can the best fifty lb.

Trueness of Type.—Each potato should be typical of the variety to which it belongs—*i.e.*, the characteristics should be clearly defined, enabling one to easily identify it.

Shape of Tuber.—The shape of the potato will depend largely upon variety, but the flat, round, or oval shape is favoured, because these shapes usually give best quality tubers.

Size of Tuber.—As a rule, select medium-sized potatoes, but if two exhibits are otherwise equal, choose the larger, unless potatoes are so large as to be considered overgrown.

Eyes.—The eyes of the potato should be medium deep, well defined, and not too numerous. Deep eyes cause waste in peeling, and have a tendency to affect shape of tuber. Eyes too shallow are low in vitality.

Skin.—The skin may be whitish, brown, reddish, yellowish-brown, blue, or black, depending on variety. It may be thick or thin, tough or brittle. A thick, fairly tough skin is preferred, lenticels not too prominent, or potatoes sunburned.

Texture of Tuber.—This is determined by cutting tuber. A fairly fine-grained, brittle texture is preferred. A tough texture does not cook up mealy, and is usually poor in flavour.

Soundness.—Select potatoes that are sound and firm, not wrinkled and flabby. Hollow potatoes are objectionable, likewise any internal discolouration indicating a diseased condition. The judge should cut two potatoes in each exhibit.

Freedom From Blemishes.

The judge will deduct from score for scab spots, or skin ruptures from any other diseases, cuts, bruises, scratches, or any other defects.

How to Select Potatoes for Contest and Exhibition.

First study the score card, which is used as a standard by which the exhibitors and judges can be guided. As soon as you are familiar with the points which make up a good exhibit, place the potatoes which have been chosen as worthy of consideration on a table before you, and carefully select the twelve best tubers which conform to the score card, and also the best 50 lb.

Packing Potatoes to Send to Contest.

As soon as the final selection has been made, each potato for the best dozen should be wrapped in paper and placed in a box just large enough to nicely contain the twelve potatoes, so that they will not move or roll about and become bruised in handling. The box should be lined with two or three thicknesses of newspaper to prevent freezing during shipment.

The best 50-lb. exhibit should be carefully sacked, tied, and handled, so as to avoid bruising.

Prizes.

Local, County, and State prizes will be given for the largest yield of good marketable potatoes. Local and County first and second prizes will also be given for best 50 lb., best dozen potatoes grown by the contestant, and also for the best essay on potato-growing, as explained in the rules of contest.

SILOS.

The "Queenslander Herald and Nord-Australiche Zeitung" of 3rd July, writes as follows on the question of silos:—

"The word 'Silo' or 'Ensilage,' which has been of late so much discussed, is probably even yet, amongst our farmers and graziers, somewhat hazy. Everyone knows that it is a matter of a new method conservation of fodder, and, as all new ideas are often mistrusted, the interest in the question is slow of acceptation. And yet ensilage is neither something very new, nor is the distrust of it justified. It is known that it deals with a new method of forage conservation, and, as all new ideas are generally looked upon with suspicion, very slight interest is taken in it. Yet ensilage is neither something very new, nor is there any

justification for mistrusting it, as may be deduced from the fact that its practical value is answered for by farmers and the State Department of Agriculture. Clearly ensilage has long since passed out of the experimental stage, and so well approved itself in many cases that the only wonder is that greater attention has not been paid to this method of fodder conservation here, where dry weather conditions play so important a part in farm life, for it is especially for such seasons, bringing with them the scarcity of green fodder, that ensilage comes in to secure a partial compensation.

"All fodder plants contain a more or less percentage of starch, sugar, and gum, which constitute their nourishing properties, and furthermore they contain sundry salts and a certain quantity of water conditional to and increasing the digestibility of the fodder. Under the old method of fodder conservation—that is, turning it into hay—a large portion of this water is evaporated, and consequently with it much of its digestibility, with the result that hay-fed cattle suffered by want of nourishment, and dairy cattle especially yielded far less milk.

"Now ensilage endeavours to retain the moisture in the fodder, and this is achieved by preventing as much as possible the access of dry air, which is exactly the reverse of the preservation of hay, which demands as a first requisite a dry atmosphere. And here we have an advantage presented by the establishment of the silo. Whilst, formerly, the hay harvest and its result depended so much on the weather that the farmer looked upon every rain cloud as a threatening spectre, the making of ensilage is entirely independent of weather conditions; indeed, moist weather is preferred by many farmers when making ensilage, seeing that a larger moisture content in the fodder is considered beneficial during manufacture, the process of which is generally as follows:—

"The green forage is cut in the usual manner, preferably before having arrived at full maturity. The silo into which it is placed may be constructed in several ways, either in the form of a pit in the ground or built up in the shape of a round or square tower. Latterly silos have been built of concrete, which is said to adapt itself well to the purpose, but this is more costly.

"Equally good for the purpose, and comparatively cheap to construct, for the average farmer is a wooden building, the size of which will of course depend on the quantity of fodder to be ensiled. In Australia there are silos of from 40 to 100 tons capacity.

"For a description of the method of building a wooden silo, the reader is referred to the issue of the 'Queensland Agricultural Journal' for July, 1907. A great advantage is gained by the farmer who can afford to build two silos, as he can then continue to fill them without delay. The fodder (chaffed) is emptied into the silo and firmly trodden down. After a day's work, the silage is left for a while to settle further by its own weight. Should there be more than one silo, the filling of the second may be proceeded with next day, and on the third day the first silo may be further filled, and so on until both are

filled, being finally covered with planks or hay. Now there begins inside the silo, owing to the moist heat, a kind of fermentation of the fodder, which very shortly imparts to it a brown colour, without, however, removing any of its juicy constituents. In a few weeks the contents of the silo sink often as much as 10 feet, when, should the silage not be immediately needed, the vacant space can be filled with fresh fodder. When the time arrives, when scarcity of green feed necessitates a resort to the silo, the cattle should be gradually accustomed to the new fodder by mixing it at first in small quantities, gradually increasing, with chaff and hay. Much as the cattle at first object to silage, once they are accustomed to it, they devour it greedily, and the advantage of the fodder is soon proved by the increasing yield of milk. There is another important matter to be pointed out. Certain plants, herbs, &c., which cattle will not eat in a green state, they will willingly eat after they have been prepared in a silo. Such plants are the marsh mallow, thistles, weeds of all kinds, and even the *Arundo phragmites* which grows in the swamps.

"Considering all the advantages of a silo, the cost of erection is comparatively small. The expense naturally depends upon the material used, and with respect to a wooden building the cost depends on the price of timber and labour. On the average, a wooden silo to hold 40 tons would cost about £30, and if two are built simultaneously the cost would be reduced to about £25 each. This does not in any way prohibit the construction of cheaper silos, nor of a more costly building with arrangements for filling and emptying it. We advise our countrymen to further study this method of fodder conservation.

"In conclusion, we may add a very interesting instance at the Queensland Agricultural College. There, since last December, 403 tons of fodder were made into silage. This quantity suffices to keep 50 cows in fodder for 328 days. The conservation of fodder has been taken up there in earnest, and the silo has come to stay—a proof that its great value is recognised there."

"STOVING" OUT TIMBER.

By G. B. BROOKS, Instructor in Agriculture.

The stump-jump disc plough, cultivator, and seed drill have made the question of stumping the land, more especially in cereal-growing districts, of much less concern than was hitherto the case. We find that extensive areas of box, brigalow, and belah country are cleared for the plough simply by burning off the timber level with the ground. In heavily-timbered forest country, where the land is intended for maize, potatoes, and other crops requiring thorough and constant cultivation, the removal of stumps and roots is a necessity.

Many settlers go to unnecessary expense in the burning off and the grubbing out of dead timber that could have been more cheaply and effectively got rid of by the method known as "stoving."

In "stoving out," the first operation is to open up a narrow trench close to the tree, the width varying according to size—say 12 in. for a medium, and 18 in. for a very large stump. In opening up around small trees or stumps, a shovel is seldom required, the mattock alone being quite sufficient.

The depth of the trench depends largely on the root system. To uncover the upper portion of the root is, however, generally sufficient. In the case of hard-burning trees it will be advisable to go somewhat deeper.

The opened-up trench is now filled up with small timber—1 to 3 in. in diameter, and from 12 to 18 in. long; the filling up to be a little higher than the level of the ground. The more closely the packing is done, the more effective will the process be. To complete the operation, the packing should be covered up with sods, which can generally be secured adjacent to the tree or stump. If only a few stumps are being stoved out, the sods required can be dug out with a mattock or shovel; but when extensive areas are being worked, this method will be altogether too slow. The more expeditious way is to use a plough set to cut 2 to 3 in. deep, and which will in a very short time give sufficient sods to burn off several acres.

The sods can then be handled with a fork, care being taken when placing them around the tree to see that they slightly overlap, which will prevent their opening up during the burning process. A small opening should be left uncovered in the windward side for firing, and when well alight this should also be closed up.

Further attention is seldom necessary beyond covering up any opening that may appear while the burning is in progress.

In the case of trees having very large roots, it is advisable after they have burned through and fallen away to close up the end of the burning root with a few sods. By doing so, very little root running will afterwards be found necessary.

It may be mentioned that the stoving out of a stump can be accomplished in much quicker time than that entailed in explaining the process.

IMPROVEMENTS AT GATTON COLLEGE.

[By ARTHUR MORRY, Surveyor, Department of Agriculture and Stock.

There has recently been completed at the above institution a series of improvements, which it is expected will add materially to the economical and efficient working of the same.

Power had to be provided for driving the dairy plant, the chaff-cutting and milking machines, the silo elevators, the electric dynamo, the refrigerating plant, and the irrigation and water supply centrifugal and plunger pumps. This required the use of three boilers continuously, with two others in reserve, and an oil engine. These boilers and engines have now been put out of commission, and a new suction gas and electric

power plant installed, consisting of a 45-b.h.p. Kynock suction gas engine, with a 53-b.h.p. gas plant, and all accessories complete, connected with a 24-k.w. dynamo, generating current for a 25-b.h.p. motor at the pumping station, with about 1 mile of cable and a 12-b.h.p. motor at the new dairy, and a 12-b.h.p. portable motor used for chaffcutting, woodcutting, and other purposes. An accumulator battery for electric lighting, consisting of 62 premier accumulators in glass cells, with a capacity of 450-amp. hours, has also been provided, with a motor generator for charging same. The whole of this is connected with a marble charging board mounted with the necessary instruments and meters. The old dairy building has been converted into a very excellent power-house, providing ample space for all present requirements; while the former cheese store has made an excellent accumulator battery-room.

At the pumping station a new Mather and Platt high-lift centrifugal turbine pump, with a capacity of 70 gallons per minute, has been installed for supplying the institution. This is fixed on a concrete bed, and is connected with a specially constructed concrete sump, from which a 5-in. suction pipe operates; the pump runs at a speed of 1,390 revolutions per minute, and absorbs from 7 to 9 b.h.p. The 25-b.h.p. motor driving this is protected from the weather in a suitable weather-board house, with a solid block concrete foundation carried sufficiently high to avoid ordinary floods, but which, in case of a very high rise in the creek can be detached from its bed, slung on a steel cable, and hoisted to the shed on the bank top. The irrigation pump, discharging 50,000 gallons per hour, is also operated by this same motor when running at a speed of 800 revolutions per minute.

A new dairy building was rendered necessary by the conversion of the old dairy into a power-house. This building, designed and erected by the Departmental Surveyor, provides accommodation for a complete dairy course. Separate butter and cheese manufacturing rooms; a combined testing and class room; cold stores for butter, cheese, and meat; ample veranda space; boiler-house for a 4-h.p. vertical boiler for steaming cans, &c.; condensing-house with coils; and a convenient machine-room are all provided. The latter room is fitted up with a 4-ton ammonia compressor, centrifugal pump for forcing water from the condenser well over the coils, and a 12-b.h.p. electric motor, which drives the whole without dust or smoke.

In the butter manufacturing room, a 100-lb. simplex combined churn and worker is installed, driven by electric power. The testing-room is well equipped; and cold water and steam are both laid on throughout the building.

A few things are still required to complete this useful addition to the College and, when supplied, visitors will be able to see a modern school of dairy instruction, though on a small scale.

The accompanying photographs illustrate some portions of the improvements which have been carried out under the supervision of the Departmental Surveyor.

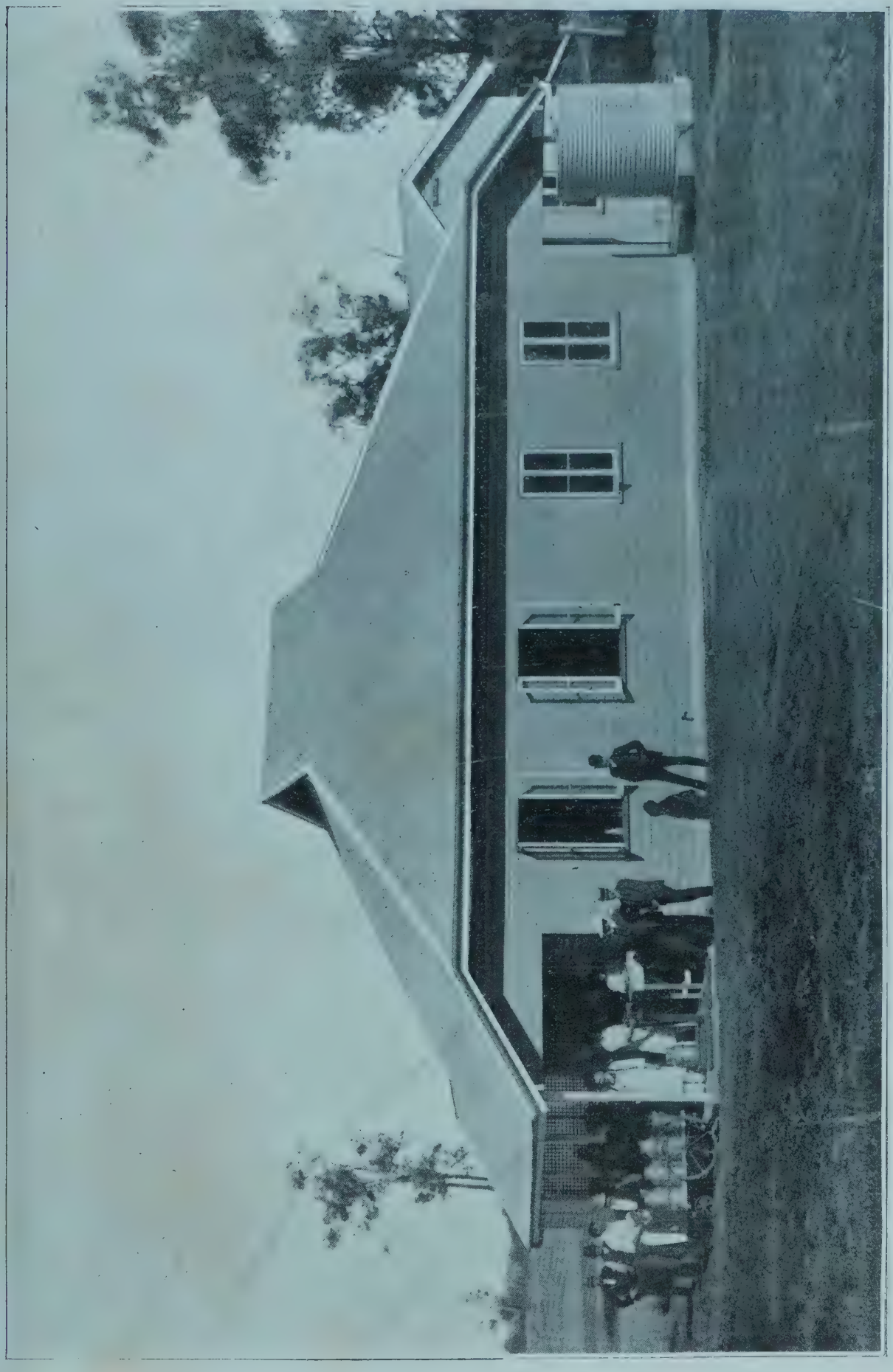

Plate 14.—New Dairy, Gatton College.

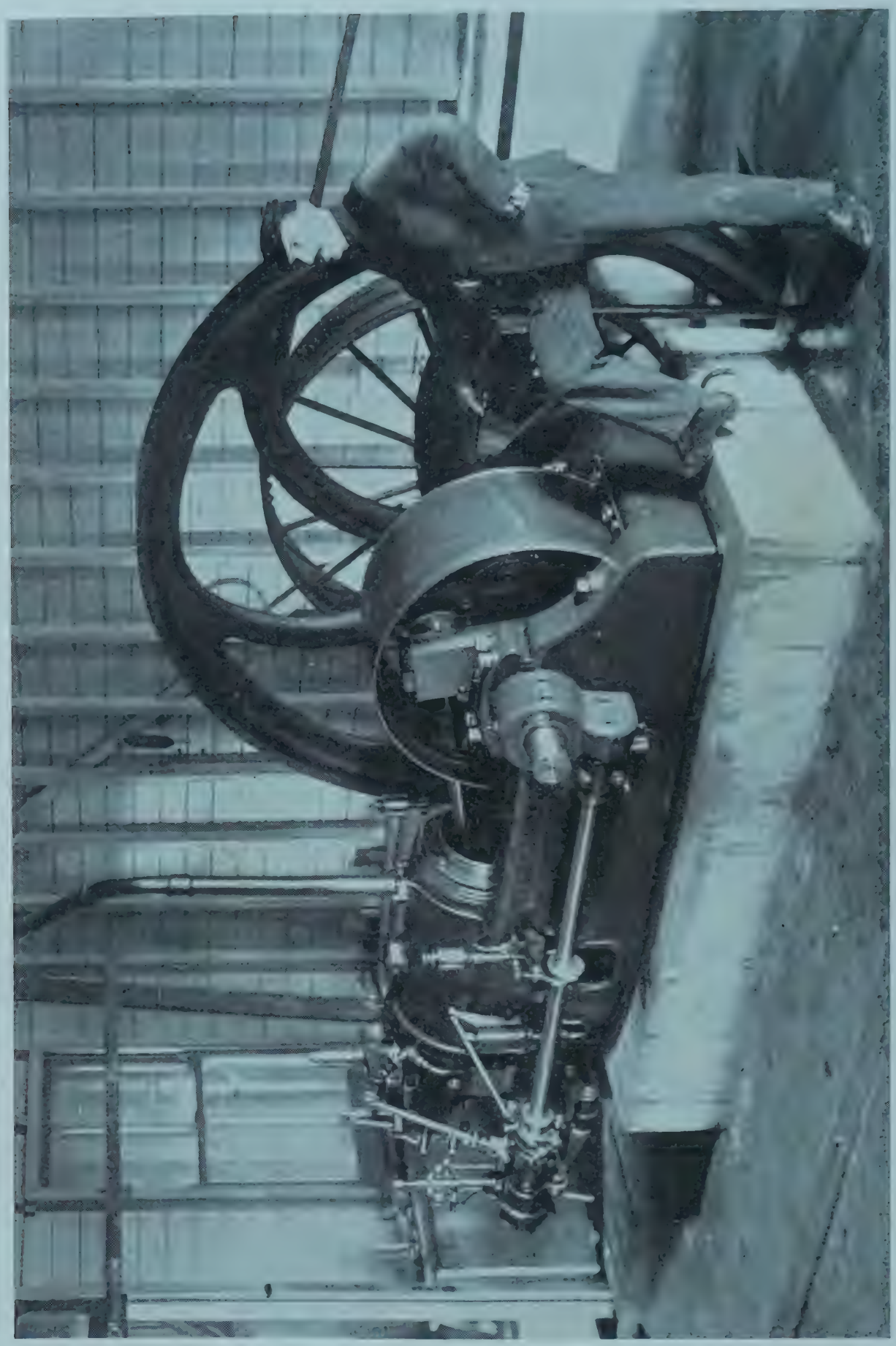

PLATE 15.—SUCTION GAS ENGINE IN POWER-HOUSE.

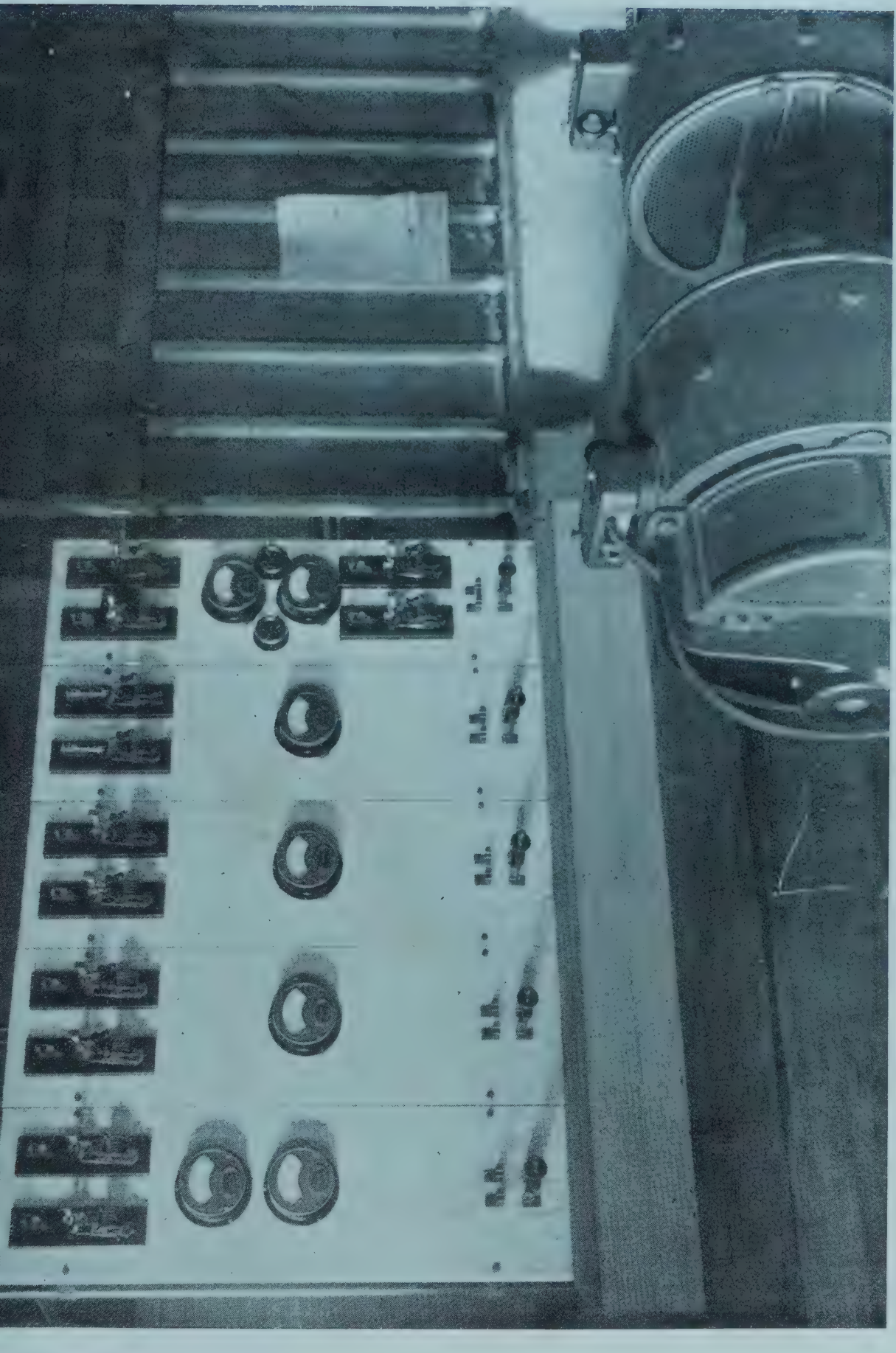

Plate 16.—Marble Switch Board and Motors in Power-house.

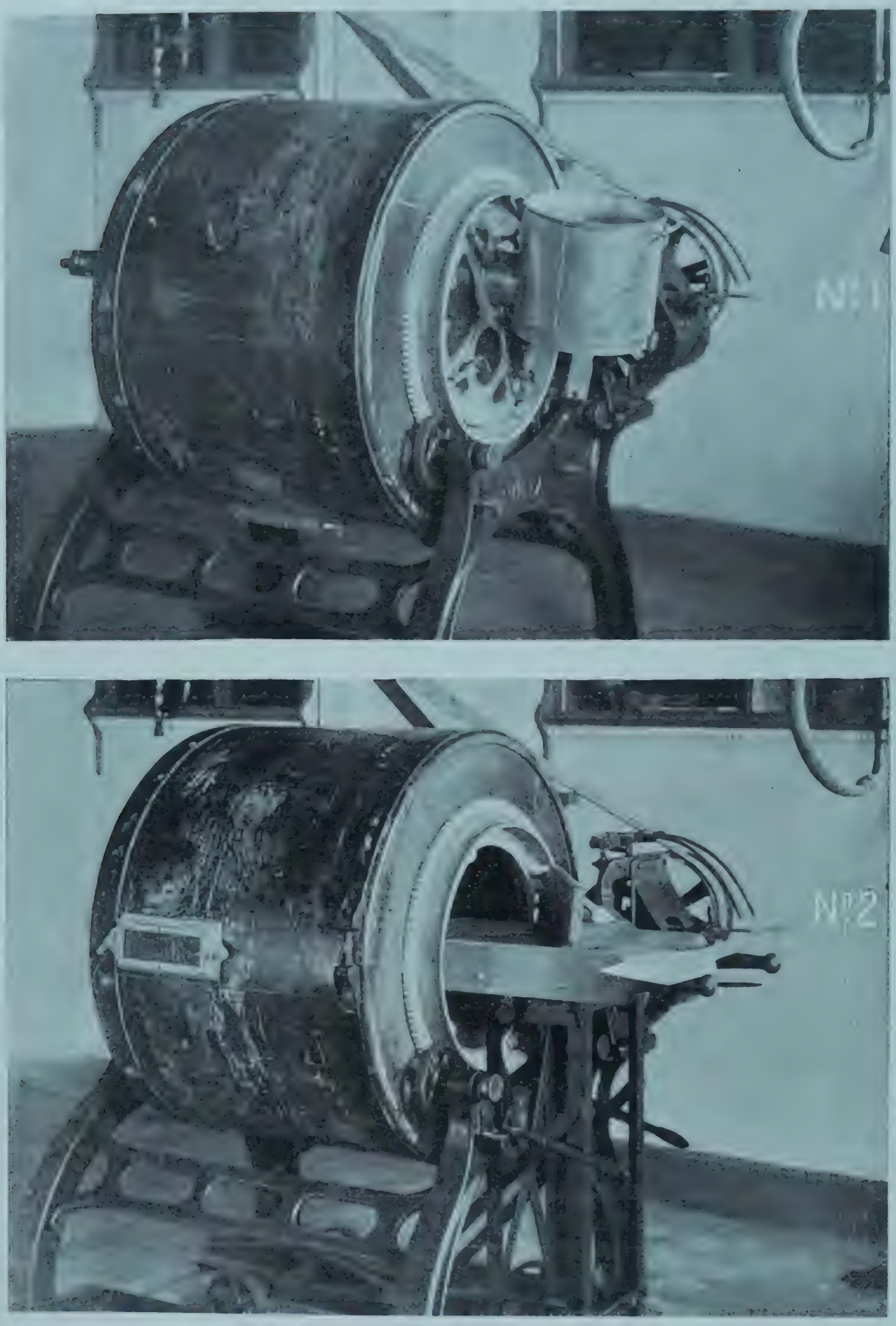

PLATE 17.—No. 1, COMBINED CHURN AND WORKER WITH CREAM FILLER ATTACHED. No. 2, CHURN AND WORKER WITH BUTTER TROLLEY IN POSITION.

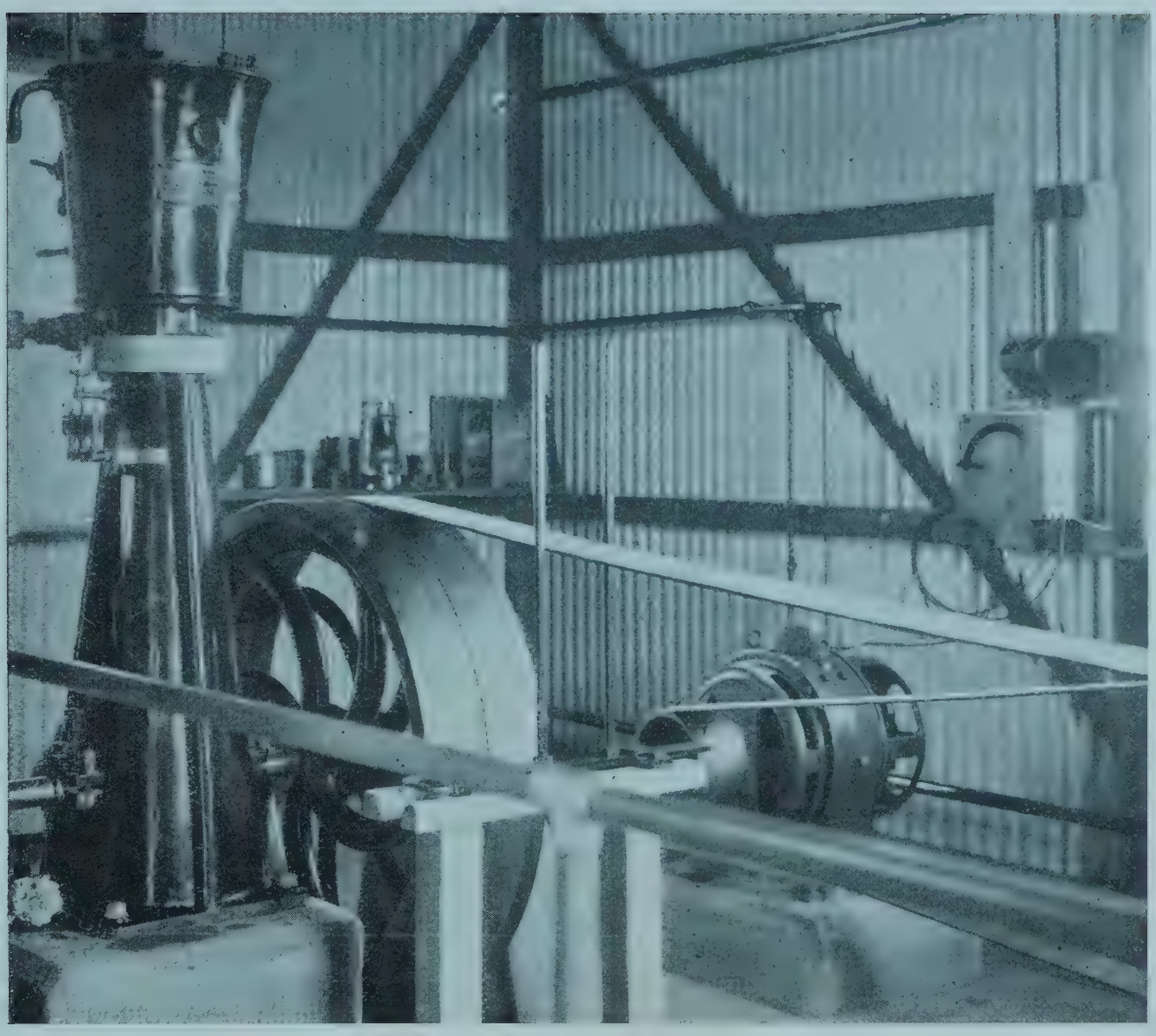

Plate 18.—Compressor Motor and Rheostat in Machine-room of Dairy.

COMPLETE FERTILISERS FOR FARM AND ORCHARD.

[CONTINUED.]

By J. C. BRÜNNICH, Chemist to the Department of Agriculture and Stock.

BEETS AND BEETROOTS.

Beets prefer a fairly rich sandy loam, but will do well on almost any soil, as long as it is not stiff and clayey. Well-rotted farmyard manure should be applied some time before sowing, and the following artificial fertiliser mixture used when thinning out or transplanting—

2 to 3 cwt. superphosphate
¾ to 1 cwt. sulphate of potash
1½ to 2 cwt. nitrolim or sulphate of ammonia
} per acre,

followed by a topdressing with 1 to 2 cwt. nitrate of lime about a month later. The sulphate of potash may be with advantage replaced by muriate of potash, or, when the sulphate is used, a dressing of common salt will be found beneficial.

Should the beet be grown without a previous application of farmyard manure, the quantity of artificial fertiliser must be increased, using—

4 to 6 cwt. superphosphate
1½ to 3 cwt. sulphate of potash
2 to 3 cwt. nitrolim
} per acre

when planting, followed by a topdressing of 1 to 2 cwt. nitrate of lime.

In a garden use—

6 lb. of superphosphate,
2 lb. of sulphate of potash,
3 lb. of nitrolim or sulphate of ammonia

for every 43 square yards of ground, followed by a top dressing with 1 to 2 lb. of nitrate of lime.

CABBAGES.

Cabbages may be grown in almost any part of Queensland under certain conditions, but naturally do best in the colder districts. Rich, mellow soil, containing plenty of humus, and an abundant supply of water, are required. From 10 to 15 tons of well-rotted farmyard manure per acre, or from 2 to 3 cwt. to every 43 square yards, should be applied when the ground is being prepared. At the time of planting apply—

4 to 6 cwt. of superphosphate
½ to 1½ cwt. of sulphate of potash
2 to 3 cwt. of nitrolim or sulphate of ammonia
} per acre,

and about a month later a topdressing of 3 cwt. of nitrate of lime. A second topdressing with 1 cwt. of nitrate of lime, when cabbages begin to heart, is very beneficial.

The same amounts of fertilisers in pounds should be applied in a garden to every 43 square yards, or, as large cabbages should be planted about 3 feet between rows, to every row 43 yards long.

Should no or only a small amount of farmyard manure be available, the amounts of nitrogenous manure should be increased by at least one half.

Commercial mixed fertilisers, containing, besides water-soluble phosphoric acid, 3 to 4 per cent. of nitrogen, and about 2 per cent. of potash, may be used in quantities from 3 to 4 cwt. per acre at the time of planting, a second dressing of 2 to 3 cwt. about a month later, and a third dressing of 1 to 2 cwt. when hearts begin to form.

CAULIFLOWERS.

Cauliflowers require a very rich loam, and, like cabbages, a heavy dressing of farmyard manure.

When using from 10 to 15 tons of stable manure per acre, when the ground is being prepared, the following mixture of artificial fertilisers should be applied, per acre, when planting :—

4 to 6 cwt. of superphosphate ;
1 to 2 cwt. of sulphate of potash ;
2 to 3 cwt. of nitrate of lime ;

the latter to be applied in two dressings.

Without farmyard manure use—

6 cwt. of superphosphate
2 cwt. of sulphate of potash
2 cwt. of nitrolim or sulphate of ammonia
} per acre

when planting, and two or three topdressings of 1 cwt. of nitrate of lime each.

CARROTS.

Carrots do best on a rich sandy loam, deeply cultivated and well drained. Stable manure should never be applied immediately before this crop is grown, but rather the preceding year.

Apply per acre—

4 to 6 cwt. of superphosphate ;
1 to 2 cwt. of sulphate of potash ;
2 cwt. of nitrolim, or sulphate of ammonia ;

and two topdressings of 1 cwt. of nitrate of lime each.

CASSAVA.

This plant yields very heavy crops of roots under favourable conditions, and thrives best on light sandy loams, with a well-drained porous subsoil. Although such a heavy cropper, this plant does not require very large amounts of artificial fertilisers. Commercial mixed fertiliser containing from 6 to 10 per cent. of water-soluble phosphoric acid, 3 per cent. of nitrogen, and 6 to 8 per cent. of potash, may be applied at the rate of $2\frac{1}{2}$ to 4 cwt. per acre. The following mixture may also be used with advantage before planting :—

1 to 2 cwt. of superphosphate
$\frac{1}{2}$ cwt. of sulphate of potash
1 cwt. of nitrolim
} per acre.

CELERY.

This vegetable requires a deep, rich, vegetable mould in a moist situation. When preparing beds or trenches, lay in at the bottom about 4 in. of well-rotted stable manure, which is to be well forked in. A heavy dressing of an artificial fertiliser containing from 6 to 10 per cent. of soluble phosphoric acid, 6 to 8 per cent. of potash, and 4 to 6 per cent. of nitrogen, should also be applied, using about 6 cwt. per acre, previous to planting out, and two or three topdressings of 1 cwt. each.

The use of liquid manure and sprinkling with a little salt are also to be recommended.

Instead of the ready mixed fertiliser, the following mixture may be used with advantage :—

3 cwt. superphosphate
1½ cwt. sulphate of potash
2 cwt. nitrolim, or sulphate of ammonia
} per acre

at the time of planting, followed by two topdressings with a mixture of—

1 cwt. superphosphate
½ cwt. sulphate of potash
1 cwt. nitrate of lime
} per acre.

In this case muriate of potash may with advantage replace the sulphate of potash.

CHERRIES.

The successful growth of this fruit is confined to a few localities in this State, as it requires a well-defined cold winter and rather rich, deep, well-drained loam. In suitable localities the use of artificial fertilisers is particularly profitable for this crop, and in accordance with the size of the tree and expected crop the following quantities should be applied per tree :—

2 to 4 lb. of superphosphate ;
1 to 2 lb. of sulphate of potash ;
1 to 1½ lb. of nitrolim, or sulphate of ammonia ;

or,

1 lb. of superphosphate ;
2 to 4 lb. bonemeal ;
1 to 2 lb. sulphate of potash ;
1 to 2 lb. dried blood ;

or,

from 5 to 10 lb. of a mixed fertiliser containing from 6 to 12 per cent. soluble phosphoric acid, 3½ to 4 per cent. of nitrogen, and 5 to 6 per cent. of potash.

COCOANUT PALM.

The cultivation on commercial lines is confined to the Northern coastal districts and the islands off the coast. The palm thrives best in the loose, moist, sandy soils on or near the seashore. In nearly all tropical countries where this palm is grown to any extent, manuring with artificial fertilisers has been found very profitable.

Apply round each tree, a little distance from the butt, towards the end of the rainy season, in February or March, and again at the end of winter—

1 to 2 lb. of superphosphate ;
1 to 2 lb. of sulphate of potash ;
½ to 1½ lb. of dried blood ;

or,

2 to 3 lb. meatworks manure ;
1 to 2 lb. sulphate of potash.

Compost made of seaweeds and woodashes, to which some pulverised oil cake should be added, can be used with advantage.

COFFEE.

Young seedlings require a fairly rich, sandy soil, containing plenty of humus, and are generally fertilised with stable manure or compost. The use of about 1 lb. of nitrate of lime to every row 30 yards long increases the growth of the seedlings, so that they can be planted out much sooner. For the plantation select a rich, sandy loam, containing an abundance of humus, with a well-drained, gravelly subsoil. If clayey loams are used, they will have to be limed every four or five years. Before planting out, use a fertiliser mixture containing from 7 to 10 per cent. of soluble phosphoric acid, 4 to 6 per cent. of nitrogen, and 10 to 12 per cent. of potash, in quantities from 7 to 9 cwt. per acre ; or the following fertilisers :—

3 to 4 cwt. superphosphate
1 to 1½ cwt. sulphate of potash } per acre.
1½ to 2 cwt. nitrolim

For the first four years the trees require little artificial manure, but will benefit by an application of ¾ lb. to 1 lb. per tree of the abovementioned fertiliser mixture. Trees from five to eight years old require 2 lb. per tree, and from eight years old or more 3 lb. per tree, of a mixture containing a little less nitrogen, viz. :—

10 per cent. of water-soluble phosphoric acid,
4 per cent. of nitrogen, and
8 per cent. of potash.

A similar application is effected by using—

1 lb. superphosphate,
½ lb. sulphate of potash,
½ lb. nitrolim

per tree, between the age of five to eight years, and

1½ lb. superphosphate,
¾ lb. sulphate of potash,
½ lb. nitrolim

per tree more than eight years old. The fertiliser must be thoroughly mixed with the soil around the trees, in a circle about equal to the spread of the branches. In order to get good results, it is absolutely necessary to keep up the humus contents of the soil by using plenty of compost or stable manure, or a mulch of a green manure crop grown between the rows of trees.

CORN (MAIZE).

Corn does best in a deep, sandy loam, rich in humus, and not containing too much clay. This crop makes a heavy demand on plant foods, particularly when grown for **ensilage** or **green fodder,** and farmyard manure used in combination with artificial fertiliser gives the best results. Apply in the drills, when planting, any of the following mixtures :—

2 to 4 cwt. of superphosphate
½ to 1½ cwt. of sulphate of potash
2 to 1 cwt. of sulphate of ammonia or nitrolim } per acre ;

or,

3 to 5 cwt. of bonemeal
½ to 1½ cwt. of sulphate of potash
1 to 1½ cwt. of dried blood, or nitrate of lime } per acre ;

or,

from 3 to 5 cwt. of a fertiliser mixture containing 7 to 10 per cent. phosphoric acid (chiefly water-soluble), from 3 to 4 per cent. of nitrogen, and from 6 to 8 per cent. of potash. Part of the manure, 2 to 3 cwt., may be applied when sowing, and 1 cwt. or more between the drills before hilling.

When maize is grown for **grain,** the amounts of artificial fertilisers may be varied, and in a rich soil the manure supplying nitrogen left out altogether, using per acre—

3 cwt. of superphosphate ;
1 cwt. of sulphate of potash.

In a poor soil about ½ cwt. of dried blood or of nitrolim may be added.

COTTON.

Several districts in Queensland are eminently suitable for the culture of cotton, as this plant is well adapted to stand droughty conditions. Cotton does best on deep, sandy loams, or even on fairly heavy clay, if it contains plenty of lime and a fair amount of humus. When grown in rotation with other crops, more particularly leguminous crops, only light dressings with artificial fertilisers are required.

Apply per acre—

2 cwt. of superphosphate or bonemeal ;
½ cwt. of sulphate of potash ;
1 to 1½ cwt. of dried blood or nitrate of lime ;

or,

2 cwt. Thomas phosphate ;
½ cwt. sulphate of potash ;
½ cwt. ammonium sulphate ;

or,

3 to 4 cwt. of meatworks manure (with blood) ;
½ cwt. sulphate of potash ;

or,

from 3 to 6 cwt. of a mixed fertiliser containing 8 to 10 per cent. phosphoric acid, 2½ to 3 per cent. of nitrogen, and 4 per cent. of potash.

In localities where the crop is susceptible to blight the following mixture should be tried :—

2 cwt. Thomas phosphate
1 to 1½ cwt. of kainit
1 to 1½ cwt. of nitrate of lime or dried blood } per acre.

COWPEAS.

This crop is chiefly grown as a green manure crop, but makes a very nutritious hay and chaff, and the pods may be eaten as a vegetable. This leguminous plant prefers a fairly rich sandy loam, which must contain a liberal amount of lime.

Apply per acre from 5 to 6 cwt. of a mixed fertiliser containing from 7 to 9 per cent. of soluble phosphoric acid, and 9 per cent. of potash, or use one of the following fertilisers :—

2 cwt. superphosphate
3 cwt. kainit } per acre ;

or,

2 cwt. superphosphate
¾ to 1 cwt. muriate of potash } per acre ;

or,

3 cwt. Thomas phosphate
¾ to 1 cwt. muriate of potash or sulphate of potash } per acre ;

One half of the manure can be broadcasted and the other half applied in the drills when planting.

Although as a rule no nitrogen needs to be applied, in many instances, when grown as a green manure on poor, exhausted soils, the addition of a little nitrate of lime, or of nitrolim, in the drills, at the rate of ½ cwt. per acre, may be very beneficial.

CUCUMBERS.

This vegetable may be grown on almost any soil, as long as it is fairly light and loamy, and plenty of manure is added. The pits or hills should be prepared by mixing a large amount of well-rotted stable manure, sheep or fowl dung, ashes, and bonedust with the soil.

Apply in addition the following artificial fertilisers :—

3 to 4 cwt. of superphosphate
1½ to 2 cwt. of sulphate of potash
1½ cwt. of sulphate of ammonia or nitrolim } per acre ;

or the same amounts in pounds to every 43 square yards.

An excessive amount of nitrogenous manure, more particularly in the form of quick-acting nitrates, may cause an excessive growth of vines and poor quality of cucumbers.

CUSTARD APPLES (Cherimoyer).

This tree is easily grown on most parts of coastal Queensland, or any fair class of soil. Apply, in accordance with the age of the tree :—

1 to 3 lb. superphosphate
2 to 6 lb. meatworks manure (with blood)
1 to 2 lb. sulphate of potash } per tree ;

EGG PLANTS or EGG FRUITS.

This vegetable is as hardy and easy to grow as the closely allied tomato, and requires a fairly rich sandy loam.

Apply per acre from 8 to 12 cwt. of a fertiliser containing 5 to 7 per cent. soluble phosphoric acid, 4 per cent. nitrogen, and 8 to 9 per cent of potash, or use the following mixture :—

4 to 6 cwt. of superphosphate
1½ to 2 cwt. of sulphate of potash
1½ to 2 cwt. of nitrolim or sulphate of ammonia
} per acre;

or the same quantities in pounds s to every 43 square yard.

ESCHALOTS (see Leeks).

FIGS.

Figs may be grown in almost any soil, but a fairly rich sandy loam is preferable. Figtrees are very greedy feeders, and the roots spread for long distances in all directions, to get plant foods or moisture.

Apply, per tree, in accordance with its size :—

2 to 4 lb. bonemeal
1 to 2 lb. superphosphate
1 to 2 lb. sulphate of potash ;

or,

2 to 4 lb. meatworks manure
1 to 2 lb. superphosphate
3 to 6 lb. kainit.

FLOWER GARDEN.

For flowers—more particularly for carnations, crysanthemums, &c.—prepare a manuring mixture as follows :—

½ cwt. superphosphate
¼ cwt. bonedust
¼ cwt. nitrolim (or dried blood)
14 lb. sulphate of potash,

and apply at the rate of 8 to 10 lb. to every 43 aquare yards, or from 3 to 4 oz. to every square yard; or from 1 to 1½ oz. of fertiliser to every 2 lb. of potting soil.

GRAPES.

Grapes may be successfully grown over a great part of Queensland, extending from the coast to the interior. Any soil, from a light loam to a clayey soil, is suitable, as long as it contains plenty of sand and gravel, and is well-drained.

Improved methods of cultivation and the use of artificial fertilisers increases yield and quality of the fruit considerably. Excellent results have been obtained in South Australia with a yearly application of :—

1 cwt. superphosphate
¼ cwt. sulphate of potash
¼ cwt. sulphate of ammonia
} per acre;

or applying about 3 oz. of the mixture to each vine.

In many localities a heavier dressing of artificial fertilisers may be profitable, using, for instance :—

2 cwt. superphosphate
1 cwt. sulphate of potash
½ cwt. sulphate of ammonia or nitrolim
} per acre;

or about ½ lb. of the mixture to each vine.

Green manuring, in addition to the yearly application of artificial fertilisers, is strongly recommended, and the crop should be ploughed under to a depth of at least 9 inches.

Liming the soil every five or six years, with about 1 ton of air-slaked lime or gypsum per acre, may also be very profitable.

HOPS.

Hops have been grown in a few localities in Queensland, but the product obtained was not of a very high quality. Our climate is hardly cold enough, and the rainfall barely sufficient. Hops require a very rich sandy loam and heavy applications of artificial fertilisers, up to 10 cwt. per acre, so that a profitable cultivation in Queensland is hardly probable.

LEEKS and ESCHALOTS.

These vegetables require a deep, rich, sandy loam, a liberal manuring with stable manure, ashes, bonedust, &c., when preparing the bed, and a copious supply of liquid manure during their growth.

A complete fertiliser is made up as follows :—

4 to 6 cwt. superphosphate
1 to 1½ cwt. sulphate of potash
2 to 3 cwt. sulphate of ammonia or nitrolim
} per acre;

or the same quantities in pounds to every 43 square yards.

LEMONS (Limes and Citrons).

Citrus fruits may be grown from one end of the State to the other, provided that the soil is suitable, and for this reason the careful selection of the soil is of the greatest importance. The soil need not be extremely rich, but must be in good mechanical condition, friable and perfectly drained, with a free, porous subsoil. The soil most suitable is a deep, sandy loam, of reddish, brownish, or chocolate colour, and fairly rich in humus and lime. Clayey subsoils must be avoided.

Lemons grow and bear well in the coastal districts, but the fruit is not of a high quality, and better results are obtained inland. Limes and Citrons, however, do particularly well all along our eastern seaboard.

As soon as the trees come into bearing the use of artificial fertiliser will become profitable, both in regard to quantity and quality of the fruit. It is always best if the use of artificial fertiliser is combined with application of either farmyard manure, compost, or green manure.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF JUNE, 1912.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lerida ...	Ayrshire	4 Mar., 1912	884	4·2	38·70	
Lady Margaret	,, ...	4 Mar. ,,	695	4·0	31·06	
Nellie II. ...	Shorthorn... ...	1 Feb. ,,	615	4·2	28·93	
Lavinia's Pride	Ayrshire	23 Feb. ,,	599	4·1	27·47	
Miss Hayden	Shorthorn... ...	21 Mar. ,,	579	4·0	25·87	
Davidina ...	Ayrshire	29 Dec., 1911	558	4·1	25·54	
Burton's Lady	Shorthorn... ..	1 June, 1912	569	3·9	24·76	
Redrose ...	,, ...	23 Mar. ,,	475	4·5	24·07	
Laura ...	Ayrshire	6 Mar. ,,	496	4·2	23·33	
Miss Jean ...	,, ...	10 April ,,	503	4·1	23·07	
Lady Morton	Shorthorn... ...	29 Feb. ,,	480	3·9	20·89	
Lark ...	Ayrshire	29 Nov., 1911	444	4·2	20·88	
Flora ...	Jersey	10 Feb., 1912	418	4·4	20·64	
Butter ...	Shorthorn... ...	6 Nov., 1911	426	4·3	20·53	
Mist ...	Holstein	2 Oct. ,,	467	3·9	20·32	
Glen ...	Shorthorn... ...	30 Sept. ,,	350	5·1	20·17	
Dilly ...	,, ...	9 Feb., 1912	448	4·0	20·01	

RESULT OF MILK AND BUTTER COMPETITION.

ROCKHAMPTON AGRICULTURAL SOCIETY'S SHOW, JUNE, 1912.

We have received from the secretary of the Rockhampton Agricultural Society the following account of the Dairy Competition held in connection with the June show of the Rockhampton Agricultural Society. We regret that it was received too late for earlier publication:—

PERFORMANCES OF COWS.

—	Whitebaek.	Fanny.	Jenny.	Posy.	Yellow Girl.	Mavis.	Florrie.	Stumpy.
Weight of morning milk (lb)	18·5	22·5	18·5	14·5	18·0	17·0	16·0	14·5
Weight of evening milk (lb)	17·5	20·0	14·0	12·5	12·0	10·0	16·5	12·0
Total weight of milk (lb) ..	36·0	42·5	32·5	27·0	30·0	27·0	32·5	26·5
Percentage of butter fat in the morning milk ..	4·4	3·0	3·2	5·0	4·4	3·8	3·2	3·8
Percentage of butter fat in the evening milk ..	4·0	3·4	4·0	4·2	4·6	4·4	3·6	3·6
Commercial butter from morning milk (lb) ..	0·90	0·72	0·74	0·80	0·88	0·71	0·56	3·60
Commercial butter from evening milk (lb) ..	0·77	0·75	0·61	0·58	0·61	0·49	0·66	0·48
Total commercial butter (lb)	1·67	1·47	1·35	1·38	1·49	1·20	1·22	1·08

Performances of Cows—*continued.*

—	Whiteback.	Fanny.	Jenny.	Posy.	Yellow Girl.	Mavis.	Florrie.	Stumpy.
Points Awarded.								
Weight of commercial butter (lb)	33·4	29·5	27·0	27·7	29·8	24·0	24·4	21·6
Weight of milk (lb) ..	36·0	42·5	32·5	27·0	30·0	27·0	32·5	26·5
Points for time in milk ..	3·6	0	2·7	6·7	0	6·1	0	5·8
Points deducted for less than three per cent. of butter fat	0	0	0	0	0	0	0	0
Total	73·0	72·0	62·2	61·4	59·8	57·1	56·9	53·0

MILK AND BUTTER COMPETITION.

A milk and butter competition was again held in connection with the show. There were eight competitors, as compared with six last year. The prizes were: £10 10s., £5 5s., and £2 2s. The competition, as formerly, was carried out on the farms, where the cows were milked in the bails used every morning and evening, and by their ordinary attendants. No cow or heifer was allowed to compete unless she had calved at least seven days before the 1st May, 1912. A representative of the society attended the day before the milkings to see the cows milked dry and again at the test milkings. The milk obtained at each milking was weighed, and samples were taken for the purpose of ascertaining the percentage of butter fat. The regulations provided that the prizes were to be awarded to the cows that revealed the greatest merit with respect to the weight of milk, the quantity of butter fat, and the ratio of milk to the pound of commercial butter, a point being given for every ten days in milk since calving, deducting the first forty days, but with a maximum of fourteen points; a point for every pound of milk produced at two milkings; twenty points for every pound of marketable butter indicated according to the Babcock test, with a deduction of ten points each time the fat was below 3 per cent. It was also provided that, in the case of cows obtaining the same number of points, the advantage should be given to the cow that had been longest in milk. It was further provided that no prize should be given to a cow under five years of age that failed to obtain forty points, or to cows five years and over that failed to obtain fifty points. In arriving at the quantity of butter the method was that adopted by the Queensland Government. The cows were milked between the 1st and the 15th of May, inclusive, in the presence of Mr. H. T. Deighton, Government Inspector of Dairies in the Rockhampton district, who also conducted the tests for butter fat.

The results were sealed by Mr. Deighton as soon as they were completed, and were made available yesterday by the secretary (Mr. H. Hill). The cows were placed in the following order:—

Messrs. Archer Brothers' Whiteback, 73 points 1
Mrs. Ruth Watson's Fanny, 72 points 2
Messrs. Archer Brothers' Jenny, 62·2 points 3
Messrs. S. G. Hoare's Posy, 61·4 points 4
Messrs. Archer Brothers' Yellow Girl, 59·8 points 5
Mr. P. C. Marwedel's Mavis, 57·1 points 6
Mr. W. E. Higson's Florrie, 56·9 points 7
Mr. S. G. Hoare's Stumpy, 53·9 points 8

DAIRY COW COMPETITION.

In conjunction with the milk and butter competition, there was a competition for cows giving the greatest weight of milk in two milkings, the milkings in the milk and butter competition to be also the milkings in the dairy cow competition. The prizes were £2 2s. and £1 1s. There were nine competitors as against six last year. The following were the results:—

Miss Ruth Watson's Fanny, with 22·5 lb of milk in the morning and 20 lb in the evening, or a total of 42·5 lb 1
Messrs. Archer Brothers' Stella, with 22·5 lb of milk in the morning and 17·5 lb in the evening, or a total of 40 lb 2
Messrs. Archer Brothers' Whiteback, with 18·5 lb of milk in the morning and 17·5 lb in the evening, or a total of 36 lb .. 3
Messrs. Archer Brothers' Jenny, with 18·5 lb of milk in the morning and 14 lb in the evening, or a total of 32·5 lb 4
Mr. W. E. Higson's Florrie, with 16 lb of milk in the morning and 16 in the evening, or a total of 32·5 lb 4
Messrs. Archer Brothers' Yellow Girl, with 18 lb of milk in the morning and 12 lb in the evening, or a total of 30 lb 5
Mr. P. C. Marwedel's Mavis, with 17 lb of milk in the morning and 10 lb in the evening, or a total of 27 lb 6
Mr. S. G. Hoare's Posy, with 14·5 lb of milk in the morning and 12·5 lb in the evening, or a total of 27 lb 7
Mr. S. G. Hoare's Stumpy, with 14·5 lb of milk in the morning and 12 lb in the evening, or a total of 26·5 lb 8

MOSQUITOES BREEDING IN SALT WATER.

The "Bulletin Agricole," Mauritius (April, 1912), states that Mons. Magen, Inspector of Agriculture in Cambodia, with Dr. Pannetier have found on the sea-shore, in a rocky hole full of salt water, a number of larvæ of the Anophele mosquito. This, says the Bulletin, is an interesting fact, since it proves that this redoubtable parasite can exist in salt water.

[When in New Guinea lately, we heard a similar statement as to Anophele mosquito larvæ being found in the salt water holes near the Baubagwina River, at Cloudy Bay, but, of course, no one believed it, and there was no scientific member of our party to investigate the truth or otherwise of the statement.—Ed. "Q.A.J."]

State Farms.

SOY BEAN TESTS AT ROMA STATE FARM.

From time to time articles have appeared illustrating the value of this crop, the great demand which exists for the seed, and the yields obtained in the various countries where it is extensively grown. Such will no doubt result in inquiries being received from farmers in the future for seed of the most suitable variety. In order to be in a position to be able to state which of the most common varieties was the best suited for this part of the State, the following kinds were tested last season, viz.:—Lange, Yellow, Black, and Yellow.

The seed was sown in rather poor sandy soil, on the 11th November, and the majority of those that germinated were through by the 16th.

The germination of the black was equal to about 80 per cent.; of the other two about 10 per cent. Whether the low germination was due to the age of the seed or the percentage of moisture in the soil not being sufficient was not determined; but most likely the former, as the black variety was received from Biggenden, and had a fresh appearance.

Of the resulting plants, only those from the black seed reached the seeding stage, the others succumbing during a dry spell. The plants of this variety only grew to about 15 in. high, producing very little foliage, did not branch, flowered early, producing pods as many as could be accommodated on the stalk, which, owing to the dry weather, were not any length, nor were they well filled; and when the plants dried off the pulse was found to be only half developed, notwithstanding the period which had elapsed since blossoming time.

The results, so far as the value of this crop is concerned, cannot be taken as final, for the following reasons:—They require a rich soil to grow in, more humid conditions, and sowing earlier in the season. Then again, there may be varieties amongst the dozens not tested here, at least, which may have characteristics which render them more suitable than those experimented with.

There was no comparison between the varieties grown and the cowpeas sown at the same time alongside in any way, as the latter germinated well, grew feet to inches of the other, produced a good crop of well-grown pulse, and the roots were covered with nodules, which were totally absent in the Soy beans, which had very poor root system, and one which appears more adapted for a climate where occasional showers are likely to be experienced than one where the periodical dry spells necessitate the plants obtaining their moisture from below.

Two features possessed by the Soy bean which, unhappily, are not found in the cowpea, is the ease of harvesting and the apparent even ripening of the pods.

It is intended this coming season to endeavour to secure seed of varieties more suited to the district, and sow them on a better class of soil than was devoted to the test last season.

Until further evidence is forthcoming, the growing of these beans in place of cowpeas for fodder, pulse, or as soil renovators, in this part of the State, at least, is not to be thought of; still, a few might be sown adjacent to home for trial purposes, and the beans used as a vegetable.

COWPEA TESTS AT WARREN STATE FARM.

By T. JONES, Manager State Farm, Warren.

Cowpeas have always proved to be our best fodder friend in dry weather, and to determine which variety is the most suitable for our locality, the following varieties were planted:—

No. 1. *Black.*—This variety has been grown here for three years, and is a good general purpose crop. It is rather difficult to harvest, owing to its creeping tendency, but is always a good yielder. The colour of the seed is black.

No. 2. *Whip-poor-Will.*—This is a more vigorous grower than the black, but their habits are similar. Its creeping nature would make it difficult to harvest. I find this variety always satisfactory, and would recommend it as a bulky cropper in this locality. Colour of seed, mottled brown.

No. 3. *Clay.*—This variety resembles the black, but is not quite as vigorous a grower. Colour of seed, clay.

No. 4. *Poonah.*—This is a fine upright variety; stem and leaf fine. The most suitable of any of the varieties on the farm for haymaking. The pods are very thin, the seeds small, and the crop as a whole is of a different type to the other varieties. It could be cut with the mower, and handled with comparative ease. Colour of seed, clay.

No. 5. *Chinese Mottled.*—A crop of the same habits as Whip-poor-Will, with the exception of its being a little finer, and more upright. The colour of the seed is mottled brown, dark.

No. 6. *Red Ripper.*—A low crop of creeping habits, with very thick, coarse pods. It is a slow grower, and unsuitable for haymaking. Not worthy of another trial here.

No. 7. *Southdown.*—A coarse variety, and a heavy seed-bearer. It has a small percentage of leaf to stem, and is unsuitable for haymaking. Not worthy of another trial.

No. 8. *Brown Eye.*—This bears the largest pods of any of our varieties, but the number of pods is small. It is a creeper, with very coarse stems, and unsitable for hay. Not worthy of another trial.

No. 9. *Red.*—A medium variety, of similar habits to the black; a good all-round variety.

No. 10. *Iron.*—A most vigorous grower. The pods are long and thin. The seed is small, and of a cream colour. I am of the opinion that this would be a suitable variety to grow with maize for silage.

No. 11. *White.*—A dwarfy variety. The pods are thin and badly filled. The poorest of all the varieties here.

No. 12. *Groit.*—This is the best all-round variety up to date. The pods are medium in length and well filled. The leaf is wide and healthy, and the crop is a good height. It would make a bulky crop of first-class hay, and would not be very difficult to handle. Colour of seed, mottled grey.

Farmers will probably pay more attention to this cowpea when the varieties suitable for hay become better known.

Plate 19.—Exhibit of the State Farm, Warren, at the Rockhampton Agricultural Society's Show, June, 1912.

RINGING (CINCTURING) PEACH TREES.

By R. SOUTTER, Manager, Bungeworgorai State Farm, Roma.

In the May issue of the *Journal*, a short paragraph appeared referring to some experiments carried out in ringing peach trees at an experiment station at Bologna, Italy. As something in the same direction was entered upon at the Roma State Farm last season, a few notes on the results, as far as has been gone, may prove interesting.

For the uninitiated a brief outline of the process will be given.

Cincturing consists in the removing of a ring of bark from the stem or a branch or branches of a tree, for the purpose of obtaining more fruit, better fruit, and earlier fruit. It is also used by the horticulturist for other purposes.

The incisions for removing the bark in the case of trees are generally made with an ordinary strong pocket knife, as deep as the alburnum, or woody portion of the branch, and great care must be exercised so as not to injure this in any way.

This operation does not interfere with the upward journey of the sap, if carried out carefully, as it is the sap wood, or alburnum, which takes the principal part in its conveyance, but it does upon its return by the liber, or inner bark, after having become elaborated, with the consequence that it accumulates above the incision, resulting in a thickening of the stem, the production of more flower buds, which set better, and ultimately better and earlier maturing fruit are obtained.

The operation cannot be practised every year, as it enfeebles the plants or trees to a more or less extent.

For the experiment here three trees, set out five years previously, which, though they had made extra vigorous growth, had produced very little fruit, and were, therefore, very suitable subjects, were selected, and treated as follows:—

No. 1.—Had all its branches cinctured.

No. 2.—Control.

No. 3.—Had one branch cinctured.

A dressing of the fertiliser recommended by Mr. Brünnich for deciduous trees was applied to each, and resulted in the untreated tree producing more fruit than it had done previously. The bark was removed from the branches in a spiral fashion, so that, although they had been circumscribed, a total severance of the top from the bottom portion did not take place. The operation was carried out when the buds commenced to swell.

On tree No. 1, cuts from half an inch to an inch in width were made. There was no marked difference in the yield of fruit resulting from this, but at the close of the season it was noticeable that the smaller incision had completely healed over, thereby affording no inducement for borers, &c., to get a footing, whereas the wider incisions, though nearly covered over, did so. It may be stated here that all cuts were tarred over as a precautionary measure against outside injury. The tree bore a good crop, considering the dry season and its previous performances, of good, even quality fruit, the earliest of which ripened before any on the untreated tree by from ten to fourteen days. Though no test was

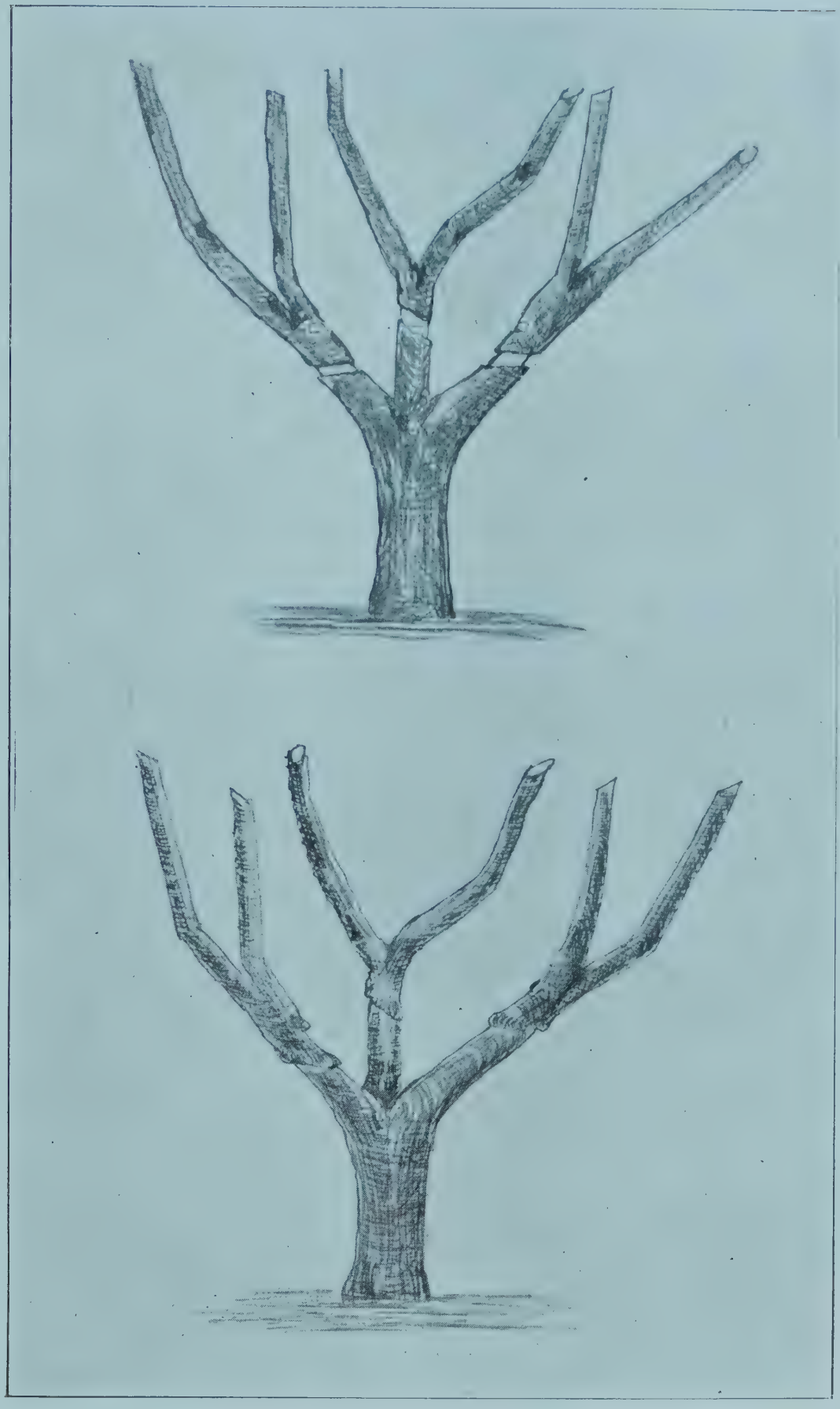

PLATE 20.—RINGING (CINCTURING) PEACH TREES.

made as to whether the fruit would hang after ripening, practically no windfalls were gathered; a very few dropped off at stoning time.

From appearances it is believed that the effects of the treatment will be more marked next season, more especially on the wider-cinctured branches, as very few sterile buds are noticeable throughout the tree, they being much plumper and better grown than usual. This may be due to a certain extent to the manure already mentioned, but not wholly so, as the remarks on No. 2 tree will show.

No. 2.—Though so far as appearance went, there was no great difference, if any, in the amount of blossom on this tree and No. 1, fewer set for fruit, and again, at stoning time many more were detached, so that at maturity only about half as many were found. Individual fruits of as good quality as on No. 1 were met with, but as a whole, they were uneven in size and of poorer appearance and flavour.

This tree contains many more blind buds, and from present appearances will not produce one-quarter the blossom that No. 1 tree will; but it is slightly early yet to make comparisons in this direction.

No. 3.—The branch operated on on this tree bore the bulk of the fruit, all of which was of even size and quality. It produced also the first ripe fruit on the tree. The fruit on the other portion was similar to that found on No. 2.

No differences in quality of growth made were noticeable in any instance.

INDIGENOUS GRASSES.

By R. JARROTT, Manager State Farm, Gindie.

The trying time those engaged in the pastoral industry are experiencing will give them an opportunity of noting the value of some of our indigenous grasses.

No doubt, under anything like fair weather conditions, the Blue grass (*Andropogon sericeus*) stands first. The fact that in a time like the present it is the first to be eaten out proves it a favourite with all kinds of stock. On country that is somewhat stony, where the soil is light in comparison with the black soil flats, it responds to a light fall of rain; but on the heavy black soil flats it requires a good fall to start it into growth after a prolonged spell of dry weather.

There is a little of two varieties of Mitchell grass in this neighbourhood, *Elymoides* and *Curvifolia,* both of which are splendid drought-resisters, and respond quickly to rain, putting out new growth from eyes on the old stalks. *Pollinia fulva,* or Red Top, is another excellent grass, especially in a dry season. It has been our mainstay. This year, in one of the paddocks, we have just finished using the bush hay that has been put up from time to time. One of the stacks, which was built about eight years ago, contained a large proportion of this variety, and it was in splendid condition. But, as it is inclined to be a little coarse, in a wet season it is necessary, if desired for hay, to cut it early, just when a portion of it is coming into bloom.

The Orchard.

THE BANANA IN QUEENSLAND.

By A. J. BOYD.

[CONTINUED FROM JULY NUMBER.]

VARIETIES OF BANANAS.

There are practically only three varieties of the Banana, so far, grown in Queensland on a commercial scale; but last year (1910) the Department of Agriculture and Stock imported several thousands of the Gros Michel variety from Jamaica. These were distributed to banana-growers in several districts; and during 1911, or early in 1912, there will be a certain quantity of this fruit on the market. Further large importations have been made by the Department, and it will not be long before the Queensland Gros Michel will enter into competition with the Fijian fruit of this name, which is so much esteemed and which brings such high prices in the Sydney and Melbourne markets. It remains to be seen, however, whether, under the present labour conditions in this State, our fruit will be able to compete with the black-labour-grown article from Fiji. A heavier duty on imported Bananas would give a great stimulus to growers in this State. Without this protection, our Banana industry will probably not again reach the importance attached to it prior to the year 1909.

The varieties of bananas cultivated in Queensland are:—

The Cavendish (*Musa Cavendishii,* syn. *Musa chinensis*).—This plant is of low stature, and is, therefore, eminently adapted for districts subject to high winds and cyclones. The fruit, when ripe, is yellow, and the flesh whitish. The bunch is very large, and the fruit of excellent flavour. This is the principal variety grown in the North, but ere long it will be superseded by the Gros Michel, of which several thousands are now growing and producing suckers, besides which further consignments have been received from Jamaica.

Lady's Finger, or small Fig, has much the appearance as to colour of fruit and flesh as the Cavendish; it is an excellent dessert fruit.

Red or Chocolate-coloured Banana (*Musa sapientum,* var. *rubra*).—This is sometimes called the "Red Spanish." The plant grows to a considerable height, rising to 25 to 30 ft. The general appearance of the plant, midrib of the leaf, and of the fruit is reddish or rather chocolate-coloured. The fruit has a good flavour, but does not find much favour with the trade, and is consequently only grown to a limited extent.

The Sugar Banana is largely grown in the Southern portion of this State. There appear to be two varieties of this fruit. Although the bunches of both are very large, yet the fruit of one is very small, whilst the other is about half the size of the Cavendish. The skin is yellow and very thin, the flesh sweet, but somewhat astringent if the fruit is cut before ripening. I think this is the fruit known in China as the "Apple Banana."

The Plantain (Musa Paradisiaca).—In some English colonies where the Banana is largely cultivated, the term "Plantain" is the common designation, while in others that of "Banana" is commonly used. Perhaps the best distinction is the application of the term "Plantain" to those varieties which are only used for cooking, or are otherwise prepared; and that of "Banana" to those which make a pleasant fruit when ripe and eaten raw. The word "Plantain" has, however, no specific meaning—in fact, the literature of the Banana may be described as chaotic. There are more than 100 varieties, but the distinction between variety and species has never been accurately determined in the genus *Musa*. The fruit of the Plantain is prominently angled.

The Gros Michel.—This is probably identical with the Martinique or Jamaica plant. The difficulty about the nomenclature of various Bananas is that they receive different names in different countries. The Martinique variety, with large yellow fruit, is known throughout the United States of America as the Jamaica Banana; in Dominica it is called "Figue de rose"; and in Trinidad, Jamaica, and Fiji, the Gros Michel. The plants are large, the bunches heavy, the fruit of fine appearance; but the flavour, in the opinion of many, is not so fine as that of the Cavendish. Still it is the favourite commercial fruit in the Southern State, and is imported in large quantities from Fiji, where it is cheaply produced by black labour, and, consequently, the importers prefer the Gros Michel to the Queensland Cavendish.

Indigenous Bananas.—In the dense scrubs of North Queensland the Banana is indigenous, and may be seen growing everywhere in great luxuriance, but the fruit borne by these wild varieties is very attenuated, bears quantities of black seed, and is quite inedible. The stalks might, however, be utilised for fibre-making. The three best known of these native bananas are—

Musa Banksii.—Fruit yellow, seed-bearing.
Musa Fitzalani.—Fruit yellow, seed-bearing.
Musa Hillii.—Very yellow, seed-bearing.

THE QUEENSLAND BANANA TRADE.

The magnitude of the Queensland Banana trade during the years 1901 to 1905 may be learned from the following figures showing the shipments from Geraldton (Innisfail) alone. Compared with the statistics for 1909, beyond which year we have no State records, the tremendous falling off in the trade may well give rise to the question, What has brought such a result about? I do not propose to suggest any political factor as entering into the question, but the fact remains that the depreciation of Queensland Bananas in the Southern Markets, especially in Victoria, is due to two causes. One is, the facilities afforded to Fiji growers to place their fruit on the Australian Market, by means of subsidised steamers, by the inadequate protection afforded to Queensland growers by the low protective duty. The other is, unfortunately, the fault of the Northern growers themselves. Instead of allowing the fruit to fill and then cutting it in such a condition that it will gradually ripen on the voyage South, and yet land in perfect condition,

the bunches are cut whilst the fruit is still in a very immature condition. The result is that such fruit will not ripen at all properly, and it cannot be wondered at that very low prices are obtained for it, or that much is condemned on arrival at the port to which it is consigned. So low a price was obtained in 1911 for our Bananas in the Southern Market that it was reported that thousands of bunches were cut and destroyed by Chinese growers in the North, as it would not pay to ship them.

I have omitted the item of freight, which is, as may be supposed, a considerable factor in the expenses.

RETURN OF BANANAS SHIPPED FROM GERALDTON FROM 1ST JANUARY, 1901, TO 31ST DECEMBER, 1904.

(From November, 1903, the Ports of Ella Bay and Liverpool Creek are included; previous to November, 1903, Bananas are from Geraldton only.)

—	Year end ng December, 1901.	Year ending December, 1902.	Year ending December, 1903.	Year ending December, 1904.
Bunches, Melbourne and Sydney	657,525	692,905	818,900	1,257,446
Cases, each 4 Bunches, Adelaide	91,660	166,816	79,704	109,872
Crates, each 25 Bunches, Queensland ..	566,175	374,354	418,895	320,220
Total Bunches	1,315,360	1,234,075	1,317,499	1,687,538

RETURNS SHOWING SHIPMENTS OF BANANAS FROM THE PORTS OF GERALDTON, ELLA BAY, COWLEY, AND TULLY RIVER FOR THE YEAR 1905.

—	Geraldton.	Cowley.	Ella Bay.	Tully River.
Bunches to Sydney and Melbourne ...	836,091	192,059	71,193	88,309
Cases to Adelaide	50,415	1,878	5,457	4,452
Crates to Queensland Ports	12,225	2,921	1,711	335
Total Bunches	898,731	196,858	78,361	93,096
Cases Oranges to Queensland Ports ...	...	...	...	1,860

VALUE OF FRUIT AND TIMBER, 1904 AND 1905.

	1904.		1905.
Fruit Value	£126,564	...	£129,134
Value of Timber (Cases) ...	3,400	...	4,792

NOTE.—The cases, which are made of silky oak and maple, are sold in Sydney, Melbourne, and Adelaide. Crates of rough silky oak, which have contained bananas, may be bought in Brisbane at from 4d. to 6d. each.

Bananas exported from the Northern Ports during the first half of the years below mentioned, January to June, being the season in the trade:—

1st January to 30th June, inclusive—

	Bunches.
1904	901,416
1905	1,087,352
1906 (cyclone year)	631,195
1907	673,428
1908	622,065
1909	469,383
1910	458,388
1911	350,203

In 1908 there was a considerable decline in the area under Bananas in Queensland; but in 1909 the freshly planted areas brought the position back to that obtaining in 1907, which, however, still left the acreage considerably short of that obtaining in previous years.

In 1909 there were 4,994 acres under Bananas, against 4,647 acres in 1908—an increase of 347 acres in the latter year; but, from the smaller area in 1908, 1,651,163 bunches were obtained, whilst in 1909 the crop only amounted to 1,396,567 bunches, a decrease of 254,596 bunches. These figures give average yields per acre of—1908, 355 bunches; 1909, 280 bunches. The average yield for the past eleven years was 306 bunches per acre.

In 1910 there were 5,198 acres planted with Bananas, the produce amounting to 1,121,075 bunches.

The quantity exported cannot here be given, as there are no longer any State records of the quantity of fruit exported.

For 1909 the exports and their value were as follow:—

	Centals.	£
New South Wales	28,765	10,770
Victoria	127,511	40,030
South Australia	40,103	17,071
Western Australia ..	10,432	8,304
Tasmania	8	9
	206,819	76,184

The actual annual production of Bananas in this State amounts usually to some 2,000,000 bunches, much of which, of course, is consumed in the country.

THE PROFITS OF BANANA-GROWING.

I am not in a position to state the profit made by banana-growers in Queensland; but it probably approximates the profits made by West Indian planters, as elicited by Mr. W. A. Smith, general manager of the Trinidad Railway, who was sent by the Agricultural Society of Trinidad to inquire into and report upon the methods of handling, transporting, and shipment of Bananas and Oranges in Jamaica, and in his report he gives some figures as to profits which are interesting. He took an estate of 300 acres, of cultivated cane land principally, which had been in cultivation about three years. The cost of clearing and preparing the land—ploughing, planting, weeding, and pruning—was a little over the average of £10 per acre. The initial expenses were fully realised with the first fruiting, after which the net clearance each year amounted to not less than £10 per acre. This is typical of many estates, both where irrigation is carried on and otherwise. An acre of Bananas planted, say, 14 ft. by 12 ft., will give roughly 250 plants, or three stems to each stock. Under good tillage and with average luck, these should produce not less than 300 bunches annually, extending over the ratooning period, which varies from 3 to 6 years. To be on the safe side, take 260 full-paying bunches, which realise an average price of 1s. 6d. The gross revenue

comes to £19 10s., and, after deducting say 45 per cent. for general management, including propping the fruit stems, reaping, carting, and interest on capital, the net clearance is not less than £10 per acre.

One hundred acres of Bananas in full bearing, under average conditions of soil, cultivation, and rainfall, would therefore mean an income of £1,000 a year. Mr. Smith, who is in charge of the Trinidad section of the exhibition at the Crystal Palace, says he should be inclined to say that these figures, which applied to last year, should now be reduced by 25 per cent., owing to the reduction in prices consequent upon the monopoly that has been established. But, even if this reduction be made, a profit of £7 10s. per acre is a very handsome one.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1911.							1912.						During the 5-day period, 21 to 25 June.
	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	
North.														
Ayr	...	...	...	...	...	...	...	...	...	3 53	1·16	1·01	6 70	2·33
Bowen	0·2	Nil	0·15	Nil	1·5	0·19	1·32	1·56	3·15	1 86	0·59	1·76	3·78	1·62
Cairns	1 44	1·48	0·27	0 6	0·88	1·95	0·90	4 81	16·68	5·95	4·71	5·97	8·00	6·90
Geraldton (Innisfail)...	5·10	6·20	0 79	0·30	0·73	1·61	0·75	5·50	18·24	6·01	56·14	41 84	15·25	9·60
Gindie State Farm ...	Nil	Nil	0·49	...	0·81	...	3.50	0·68	2·59	1·88	0·63	..	9 94	8·68
Herberton	0·36	0·40	0·5	Nil	0·9	0·62	5·36	5·29	2·82	1·47	1·40	2·20	2·36	1·17
Hughenden	0·2	0·2	Nil	Nil	Nil	1·37	0·69	5·78	1·84	3·52	Nil.	0·74	6·61	1·60
Kamerunga State Nurs.	...	...	...	...	...	...	...	...	...	...	*	...	...	...
Mackay	0·22	0·43	0·18	0·3	0·93	0·17	0·41	2·08	8·01	·93	3·56	3·42	5·51	3·62
Mossman	0 33	1·28	0·39	0·09	0·55	0·86	3 31	6·06	18·32	17·60	6·40	2·78	8·88	...
Rockhampton	Nil	0·24	1·17	Nil	0·40	0·6	0·81	2·50	3·24	·14	0·01	1·98	8·38	3·92
Townsville	0·11	Nil	Nil	Nil	0·39	0·31	2·84	1·64	7·57	6·35	4·51	0·63	4·49	0·92
South.														
Brisbane	0·9	1·70	2·22	0·84	4·95	0·84	1·94	1·85	2·13	1·03	0·72	0·20	7·22	4·25
Bundaberg	Nil	0·37	1·15	Nil	2·36	1·30	2·98	3·96	2·47	...	Nil.	1·33	10·23	2·72
Bungeworgorai (Roma State Farm)	...	...	...	...	...	...	...	0·73	...	2·19	Nil.	...	7·06	..
Crohamhurst	0·13	3·58	2·62	0·51	6·27	1·74	3·02	5·62	8·72	13·73,	1·77	1·39	9·99	..
Dalby	Nil	0·68	0·43	0·42	3·45	1·99	1·55	1·76	2·58	·53	Nil.	Nil	4·76	2·08
Esk	Nil	...	1·51	2·04	4·17	0·47	0 44	1·38	8·26	·22	0·36	0·11	7·43	4·06
Gatton Agric. College	Nil	0 72	0 90	0·96	3 77	0·49	1·90	3·56	3·31	7·86	0·31	...	6 63	...
Gympie	Nil	0·97	0·48	0·26	2·42	0·50	2·10	2·92	4·47	·15	0·37	0·52	2 63	2·63
Ipswich	Nil	0·59	1·12	0·34	4·71	0·25	...	1·87	3·00	·41	0·30	Nil	3·93	3·93
Maryborough	0·11	0·62	1·47	0·9	2·81	0·90	4·98	2·39	3·93	·11	0·32	1·09	9·12	3·34
Roma	Nil	0·67	1·55	0·87	1·9	1·55	1·19	0·74	0·76	·85	0·03	Nil	7·96	1·48
Tewantin	0·22	2·53	1·07	0·4	7·48	1·14	2·13	5·60	4·25	·85	0·80	8·46	8·72	4·52
Toowoomba	...	...	...	...	...	...	...	...	...	·52	0·66	0·16	6·75	2·77
Warren State Farm ...	Nil	0·6	1·01	...	0·64	...	...	0 82	1·75	2·04	0·22	1·28	9 51	
Ditto (11 days) ...	...	...	...	...	...	...	...	...	...	...	...	...	...	9·51
Warwick	Nil	1·20	1·50	0·80	1·78	2·26	0·70	1·57	·45	·56	0·02	0·9	5·69	3·15
Warwick, Hermitage State Farm ...	....	...	...	...	0·60	...	...	...	...	...	...	...	...	...
Westbrook State Farm	...	...	...	...	...	...	...	...	...	...	Nil	...	...	...
Woodford	...	...	...	...	...	...	...	...	...	...	...	...	9·78	4·46
Yandina	Nil	2·43	Nil	0·30	2·90	1·36	1·87	5·95	4·84	·95	0·88	1·39	7·42	3·20

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only. * No Report.

GEORGE G. BOND, Divisional Officer.

Tropical Industries.

THE CAROB BEAN.

This useful tree, which attains a height of from 30 to 50 ft., is a native of Southern Europe, Egypt, and Asiatic Turkey. It goes by various names, such as Locust Bean, Sow's Bread, Camel's Bread, St. John's Bread, Mesquit Bean, and Algaroba. In Germany the dried pods, which are about 8 in. long, and nearly 1 in. in width, are sold in the markets, and are much liked by children for their sweetness. There they go by the name of Johannes Brod, as it is popularly supposed to be the "Locust" which is stated in Scripture to have been part of the food of St. John.

Mr. G. Brooks, when overseer of the Kamerunga State Nursery in 1900-1901, wrote two excellent articles on this tree, which had been acclimatised there, and bore a good crop of fruit in the latter year, when many hundreds of seeds were supplied to applicants. He specially recommended it as food for stock, and, as a matter of fact, the bean is largely used, especially in Portugal and Turkey, for farm stock, and for domestic use. During the Peninsular War in 1811 and 1812, the Carob bean formed the principal food of the British cavalry and artillery horses. The beans and pods are largely used in the manufacture of brandy, of the essence of pineapple, of chocolate, and of liquorice. The tree is of slow growth, and the timber is extremely hard, durable, and takes a good polish.

It adapts itself to all kinds of soil, provided the latter is dry, and thrives very well on stony ground, and on limestone rocks, dry clay lands, and volcanic lava. In rich, deep, well-drained soil it grows to perfection and attains an enormous size. It resists the effects of drought and remains unaffected where even the olive will droop and die. It produces flowers containing both the male and female organs, and sometimes male and female flowers separately on the same tree; and again, some trees, like the papaw, are wholly male or wholly female. To ensure, therefore, the fruitfulness of all the plants, it is best to graft them, and this is done in the nursery when the plants are about 2 ft. high. From the nursery they are put into a plantation about 3½ ft. apart, and at the age of four or five years they are moved to their permanent positions. The flowers are generally borne on the older branches, and even on the stem. The green fruit changes, as it ripens, to a chocolate colour. The pods are collected by hand, or beaten down with a pole. When gathered they are spread on the floor to dry or laid in alternate layers in straw. If collected in heaps they will ferment and turn black. They must be quickly made use of or they will fall to pieces, become white and worm-eaten. The annual yield of an adult tree is from 8 to 20 cwt., and full-grown trees bend under the great weight of pods. The entire pod is eaten, and it is very sweet to the taste.

Large quantities are annually exported from Cyprus and Crete. From the latter island alone 180,000 tons have been exported in one year, most of which found its way to England. In Malta it is the predominant tree. As to climate, it may be said that the Carob will succeed wherever the orange will grow without protection in the winter. It is less hardy than the olive, and will not thrive at an elevation where the olive is productive.

Mr. G. Brooks, who has practical experience of the cultivation of the Carob in North Queensland, gave the following hints regarding germination of the seed and propagation of seedlings (*Queensland Agricultural Journal,* April, 1901, page 282, Volume VIII.) :—

"In sowing the seed, a loose open soil made up of equal parts of rich loam or vegetable matter and sand is the best. The seeds should be only just covered, for if planted deep, especially in the cold weather, they will frequently lie dormant for some considerable time. In such cases, when the soil is stirred up, the seed will readily germinate in the spring or on the approach of warm weather. This is a point that should be noted, for seeds so planted, especially in the cooler portions of the State, are frequently looked upon as unfertile if they do not speedily show signs of vitality.

" After germination, the principal thing to guard against is over-watering. Some cases have come to notice where the young seedlings have damped off, but this was in the Northern coastal districts and in moist hot weather. In the cooler portion of the State this need not be feared, however, unless obviously over-watered. There is no mistaking young seedlings, for, like many other plants of this family, they raise the seed itself above the ground, which remains there for some short time until the seed lobes open, the typical Algaroba leaf not making its appearance for some days subsequent to this. The young seedlings grow very long taproots; plants of 4 in. in height have been found to have taproots of fully 18 in. in length. This necessitates careful handling if transplanting is contemplated. If the seeds are not sown where the tree is to permanently remain, shallow boxes or tins, say 6 in. deep, filled with the compost already referred to, are preferable to ordinary garden beds. This method prevents the taproot from going too deep, and encourages a fibrous growth of root without detriment to the plant. On transplanting seedlings grown in this way, care must be taken in separating the roots when entwined, which will occur if the seed has been at all thickly sown. Otherwise the transplanting of seedlings thus propagated is much safer than that of those grown in garden beds, and, if carefully done, very few failures will result."

BUD-ROT IN THE COCOANUT.

Now that North Queensland planters are beginning to turn their attention to the cultivation of the cocoanut, it is well that they should be supplied with all possible information not only as to the methods of cultivation, and the preparation of copra, as well as the utilisation of

the husk in the manufacture of coir rope, but also as to the diseases and pests to which the cocoanut is liable. The *Tropical Agriculturist* for April publishes the following useful notes on Cocoanut Bud-rot, the results of American investigations into this ruinous disease:—

In writing last week on Cocoanut cultivation abroad, we made reference to the ravages caused by this disease in Cuba, where it has practically ruined the industry. The disease has been known in the West Indies for more than thirty years; but in Ceylon it would appear to have been first brought to official notice in 1906, when a short circular on the subject was issued by Mr. Petch, Government Entomologist.

Since that year the disease has formed the subject of special investigation by Mr. John R. Johnston, Assistant Pathologist to the U.S.A. Department of Agriculture, who, after making exhaustive researches, has issued a comprehensive report (Bulletin No. 228), in which he announces that the disease is caused by *Bacillus Coli,* or at least an organism indistinguishable from it. This bacillus is of almost universal distribution, and is commonly found in the intestines of man. The virulence of the disease in Cuba will be realised from the following facts: A grove of 450 trees was totally destroyed in two years; another grove was reduced from 1,200 to 300 bearing trees within the same period; a planter who once derived a revenue of £5,000 per annum now gets barely £500.

These facts should serve as a warning to our local planters to take every possible precaution to prevent the disease, which already exists in the Island, from assuming an epidemic form. Being of bacterial origin the malady is easily communicated by animals, birds, and insects, and when once attacked a tree may be killed in two months or take a year or more before it succumbs. The early symptoms are the yellowing and falling of the leaves and the dropping of immature nuts. Eventually the middle folded leaves bend over, and the entire heart is involved in a vile-smelling soft rot.

It is somewhat discouraging to be told that the application of various fungicidal mixtures, as remedies, gave unsatisfactory results. The only treatment recommended is of a preventive character, viz., to cut down all diseased trees and destroy them by fire, burning at the same time all *débris* consisting of fallen nuts, leaves, &c. In addition to this it is recommended that plantations should be maintained in a sanitary condition and proper methods of cultivation practised.

It is interesting to note that while previous investigators differed in their diagnosis of the primary cause of bud-rot, some attributing it to a fungus, others to insects, and so on, Mr. Petch himself, so far back as 1906, was satisfied (see page 224 of his circular) that the organisms responsible for the decay were bacteria, and recommended the felling and burning of diseased trees. He further condemned the close planting which prevails in many gardens as favouring the spread of disease by preventing the evaporation of moisture from the young shoots.

The village cultivator has yet to learn that fruit-bearing plants need a good supply of sunlight and air, and a definite feeding area for root

development, to ensure proper nutrition and promote their yielding capacity. The commonly-prevailing idea would seem to be—more plants, more fruit.

On estates under intelligent supervision the carrying out of the recommendations referred to may be reckoned upon, and, indeed, in many cases the details as to sanitation and cultivation are already receiving attention; but the constant occurrence of neglected areas in the neighbourhood of estates is a serious menace to the industry, as providing foci for the spread of insect and fungoid pests. One would imagine that the Lowcountry Products Association, which is so greatly interested in the cocoanut industry, would have conceived the idea of formulating some scheme for the maintenance of plantations in a sanitary state, with a view chiefly to improving the condition of the scandalously neglected gardens so frequently met with—rank with noxious weeds and decomposing *débris*. If pressure in some form could be brought to bear upon the owners or lessees of such properties, the advantage would be twofold, inasmuch as it would remove an existing danger to cultivated estates, and at the same time ensure better returns to the parties who have an interest in the neglected lands. Could not the services of the instructors employed by the Agricultural Society be utilised in this connection? The report under review, consisting of 175 pages, is illustrated by 14 plates and 10 text figures, which considerably enhance its value.

We can only congratulate Mr. Johnston on the satisfactory conclusion of his arduous labours and the service he has rendered not only to the American dependencies but to the tropical world at large.

RAMIE.

That the cultivation of this fibre plant will eventually be carried on in tropical countries other than China may be looked upon as certain. Up to the present the neglect of this, the finest of all fibre plants, has been due to the failure of any machine yet invented to deal with the plants. Ramie grows in many parts of Queensland, where it has been experimentally tried, luxuriantly. Even in Southern Queensland, in the neighbourhood of Brisbane, patches of Ramie may be seen, in which the stalks are from 4 to 5 ft. in height. The plant belongs to the order of nettles, and grows as luxuriantly and with as little trouble as that well-known lowly plant.

At the Fibre Congress, held at Sourabaya in July, 1911, a very exhaustive paper on Ramie was read by Mr. H. C. Bluntschli, Director of the Midden Sumatra Handel Maatschappij at Siak, Sumatra. We have not space to publish the whole of the gentleman's admirable description of the plant, its manufactures, and its possibilities, which has been kindly forwarded to us by Mr. C. Hildebrand, late of 56 Hunter street, Sydney, now of 17 Göbensh, Oberhausen, Westphalia, Germany.

who translated the paper into English. We make the following extracts, however. Respecting the value of Ramie fibre, Mr. Bluntschli said:—

"There can be no doubt that Ramie is a very valuable fibre plant. It seems almost impossible to name an industry where Ramie fibre could not be utilised. At the present time Ramie is principally used for manufacturing yarns for fish nets, balloon nets, material for filters, raincoats, motor-car caps, serviettes, plush, window curtains, imitation of Brussels lace, bandages, hosiery, stockings and socks, cigarette paper, a particularly strong and durable kind of paper for official documents, paper for banks, &c. The use of Ramie fibre is nowadays quite general, and the reason is probably its extraordinary strength and durability. In strength Ramie is equal to linen, in subtlety to cotton fibre. It possesses the shine of silk and the quality of absorption of wool. It is about three times as strong as the best Russian hemp. It is not adhesive, and the webs become whiter with use. At the present time it is not more expensive than hemp, but there is a good chance of Ramie becoming much cheaper in the future. At the great exhibitions in the different countries the articles made from Ramie have always particularly called for attention. In 1851, for instance, a certain Mr. L. Weber, from Tjogrek (Java), was awarded a medal at the London Exhibition for various articles made from Ramie, and at the Paris Exhibition, in 1878, about 100 different articles made from Ramie were exhibited. These came principally from Europe and America. At the present time it would be quite possible to organise an exhibition exclusively devoted to the culture of Ramie and its fabrics.

" The following will deal with all the different questions concerning the culture of Ramie and its treatment, &c. From the above may be gathered the great difficulties in connection with Ramie and how same can be overcome. It may be pointed out that at the present time Ramie fibre is used in nearly all countries, either by the name of Ramie or by other names. The demand for this article is therefore exceptionally great.

"It is true that a machine for which, during the years 1869-1872, the British Indian Government offered a reward of £5,000, has not yet come into existence. This machine was to manufacture a product at once suitable for the spinning mill, at a cost price of £15 per ton c.i.f. Liverpool. However, since then methods have been found to treat the fibre properly, and at the present state of science the culture of Ramie and its use in the industry has no difficulties to offer which cannot possibly be overcome. It will just be the matter of following the example of previous meetings by collecting and communicating all interesting facts, and also the experience of planters, so that the many misunderstandings, resulting from the different ideas of Ramie planters and consumers in regard to the treatment of the fibre, will be removed. and everybody will get the necessary clear and distinct idea of the article. Everybody who is interested in Ramie, or used to be interested in this commodity, will have to admit that Ramie, its cultivation and

treatment, requires more knowledge and experience than he had heretofore possessed. Let us therefore communicate all our impressions, and let us all contribute anything likely to be of interest, so that finally good results will be arrived at.

"There are about 100 species known, as for instance:—

"(*a*) Urticaceæ: utilis, rustica, heterophylla, dioica, urens, urentissima, stimulaus, cremulata, argentea postulata, baccifera.

"(*b*) Bœhmeriæ: nivea, tenacissima, candicaus, fructescens, makrophylla, platyphylla.

"As far as I know, two species, utilis and heterophylla—the nilgrin nettle growing in British India—are the only species cultivated.

"For cultivation the Bœhmeriæ is undoubtedy best suited, and of that variety again the nivea, and perhaps some species of nivea so far not separately classed, for Ramie is a very sensitive plant which may easily alter its qualities when introduced to another climate or different kind of soil. The fact that 'nivea'—this term has been adopted on account of the snowy white colour of the back of the leaves—is best suited for cultivation is based on the fact that Ramie grows well in most countries, as Java, Sumatra, China, Siam, Burma, Egypt, and also France. The species of Ramie cultivated in China for the textile industry also belongs to the nivea variety.

"Less frequently, and even rarely, the so-called green Ramie, whose leaves are of a light green colour at the back, and possess a very strong fibre, is met with. However, from this plant long stalks can only be obtained with difficulty. I myself have seen Ramie in all countries under any possible conditions of soil up to a height of several thousand feet, and also in the low land and in close proximity of the sea.

"From serious investigations and attempts at the Buitenzorg Botanical Gardens at Tjikeumeuh, where at least eight different sorts of Bœhmeriæ were closely examined, and also from the experience of the International Fibre Congress at Paris, it may be reasonably assumed that the natural fibres of all sorts of Urticaceæ may be used for making cordage and also in the place of jute and flax, whilst for textile purposes only the Bœhmeriæ may be used, which in the least possible time can produce the longest stalks. And these long stalks are, on account of the straight parallel position of their fibre, highly important for industrial purposes. At the Paris Congress a species of Ramie, which frequently branches off and shows no long stalks, was definitely condemned.

"Ramie belongs to the perennial shrubs, but can also be cultivated as an annual. This latter method has been adopted in many parts of China.

"As has been said previously, Ramie can be cultivated on almost any soil. Only hard clay or dry sandy ground should be avoided. However, as will be seen later on, quite different items should be taken

into consideration for the cultivation of Ramie, especially if textile purposes are concerned. Although it is quite possible to obtain strong fibre from Ramie growing indigenous, it is doubtful whether such Ramie will be suitable for the treatment by machinery, and whether a good financial success could be obtained.

"As a perennial plant Ramie develops a very strong root-stock with globular rhizomes, which gradually increase in size and devolop roots, either in the ground or on the surface and in all directions, in same proportion as feeding matter is contained in the soil. From this stock the 'nivea' develops stalks, which in the beginning amount to five, then ten to twenty, and afterwards fifty and more stalks, of one or two metres length, so that a Ramie plantation eventually looks like a paddock of 'Alang Alang grass.' Each stalk attains a weight of 100 to 200 grammes, and has a diameter of one to two centimetres.

"The female plant shows thick bundles of small seed bags at the top of the stalk underneath the crown of leaves.

"The Ramie stalks consist mainly of a more or less liquid substance, which explains the fact of its sensitiveness for warmth, wind, &c.

"Three per cent. of the weight of the green stalks forms the contents of fibre in a dried state, together with the gum of the plant.

"Under the most favourable conditions a crop lasts about six weeks, and—but this is only possible under the most favourable of circumstances—two crops may be expected in Europe and also in China. Five crops may be expected in the tropics.

"Ramie may easily be propagated from seed or by division of stalks. On a small scale Ramie grows best on spots with plenty of shade, and large plants are sometimes met with on protected spots.

"For a cultivation on a large scale, one has to be careful to protect the plants against too much light, draught, or humidity, and also against the wind."

[TO BE CONTINUED.]

PLANT CANES.

By H. T. HARVEY, Instructor in Cane Culture.

The photograph depicts a block of young plant cane growing on the property of Mr. J. Rae, Bundaberg. The whole of the block was planted at the same time, and all with one variety—namely, Demerara 1135. The vigorous cane on the right-hand side of the picture is from sets cut from first ratoon cane, six months old. The poor cane on the left-hand side is from sets cut from old ripe plant cane. On looking closely into the picture it will be seen that nearly half of the sets cut from the matured cane have failed to germinate.

The photo. illustrates very clearly the gain or loss a farmer may experience according to the quality of the sets used in planting. Matured cane, rich in sugar, should never be used for planting if it can be avoided. Young cane which is full of growth will always strike more rapidly and throw out stronger shoots than canes rich in sugar.

Plate 21.—Plant Sugarcane

TO TRAP SPARROWS.

Mr. Hindes, Poultry Expert at the Queensland Agricultural College, Gatton, mentions an effective sparrow-trap, a description of which was sent to "The Australian Hen," by Mr. Day, of Springwood. Mr. Day said that he had succeeded in trapping a number of sparrows by the following method:—He built a coop 6 by 3 by 3 ft., which he covered with small-mesh wire netting, leaving a small hole at the centre of the top, immediately under which he swung a board on wires, upon which a few grains of wheat were placed. The sparrows entered at the hole mentioned, but failed to find their way out again, and were thus easily caught. This is a device worth trying, as it is surprising how much grain a flock of sparrows will consume during the year. Mr. Hindes has now in the Press a pamphlet on "Poultry Farming," which will very shortly be issued by the Department of Agriculture and Stock. Such a work has long been needed as a help, not only to beginners but to many who make a business of poultry-raising and egg production for the market.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., COLONIAL BOTANIST.

Order CELASTRINEÆ.

CELASTRUS, Linn.

C. Cunninghamii, F. v. M., var. **parvifolia,** Bail. A small tree with rather dense foliage. Leaves more or less apiculate, somewhat cuneate, 4 to 12 lines long, 1 to 2 lines broad, deep-green. Flowers small and solitary. Capsule slightly broader than long, smaller than in the normal form, yellow ; seed reddish-purple, nearly enclosed in a yellow arillus.

Hab. : Chinchilla, *R. C. Beasley.*

Order COMPOSITE.

ZINNIA, Linn.

Z. pauciflora, Linn. An erect annual ; leaves from lanceolate to oblong-ovate, commonly with a subcordate base, scabrous ; peduncle sometimes nlarging and hollow. Involucre narrow-campanulate. Ray-florets from obovate to narrowly spathulate, red, purple, or yellow. Achenes of the disk 1-awned, sometimes with a rudiment of a second awn or tooth. *Zinnia multiflora,* Linn. ; Bot. Mag. 149.

Hab. : A native of Louisiana and Texas, North America ; now a naturalised weed on the Darling Downs, *Dr. F. Hamilton Kenny.*

*ACHILLEA, Linn.

Heads small, corymbose, heterogamous, and rayed, or homogamous and disciform ; ray-floret few, female, rarely neuter ; ligule short, white, pink, or yellow ; disk-florets hermaphrodite, fertile, tube terete or compressed and 2-winged, base often produced over the top of the achene, limb 5-fid. Involucral bracts in few series, appressed ; margins often scarious and black, outer shorter ; receptacle flat or elevated, scales membranous. Anther-bases obtuse. Style-arms of the hermaphrodite florets with truncate and penicillate tips. Achenes oblong or obovoid, dorsally compressed, glabrous, with 2 cartilaginous wings ; pappus none. Perennial pubescent or villous herbs. Leaves alternate, narrow, serrulate, or pinnatisect. The genus is supposed to contain about 100 species, of temperate Northern regions.

A. tanacetifolia, Allioni. A perennial, creeping at the base, the upright stems slightly branched, more or less prominently ribbed, pubescent, or villous. Leaves oblong-lanceolate in outline, bipinnatisect, the rhachis or

Plate 22.—Celastrus Cunninghamii, *F.v.M. var.* parvifolius, *Bail. n. var. A,* flower-bud; a^1, bracts; a^2, pedicel; a^3, calyx lobes; a^4, petals. *B,* flower; *C,* stamen; *D,* pistil; *E,* capsule; *F,* seed with its arillus; *G,* a single leaf to show veining. *A—D* enl., *E—G* nat. size.

midrib prominently bordered, lobes numerous, closely toothed, the lower leaves often very long, the upper half stem-clasping. Inflorescence a thick terminal corymb of reddish-purple flowers; ray-florets 5, 3-lobed.

Hab.: Southern Europe; now naturalised on the Darling Downs, *Dr. F. Hamilton Kenny.*

Order LORANTHACEÆ.

LORANTHUS, Linn.

L. Quandang, Lindl., var. (?) **amplexifolius,** Benth. Leaves broad, sessile, cordate.

Hab.: Johnstone River, *Dr. T. L. Bancroft.* Evidently a form of the above variety, but should be compared with typical specimens.

L. Quandang, Lindl., var. **Bancroftii,** Bail. n. var. (Plate 23). The whole plant more or less puberulent. Leaves bluntly lanceolate, the base truncate, rounded, then tapering to a short petiole, 2-3½ in. long, ½-1¼ in. broad, coriaceous; longitudinal nerves 5, the three central ones more prominent than the others. Inflorescence much resembling other forms. Filaments and style of a rich purple.

Hab.: Eidsvold, *Dr. T. L. Bancroft.*

Order FUNGI.

The following additions to our Fungi have been determined at Royal Botanic Gardens, Kew, England :—

HYMENOMYCETES.

Favolus princeps, Berk.

Hab.: On logs, Coomera River, *Tryon and White.*

PYRENOMYCETES.

Trabutia eucalypti, Cke. et Mass.

Hab.: On leaves of *Eucalyptus siderophloia,* var. *rostrata,* Maryborough district.

Rosellinia mammoidea, Sacc.

Hab.: On drift wood, Moreton Bay, *C. T. White.*

Pleospora vulgaris, Niessl.

Hab.: On dead stems of *Xanthium strumarium,* Brisbane River, *C. T. White.*

Didymosphæria banksiæ, Cke. et Mass.

Hab.: On leaves of *Banksia integrifolia,* Coolangatta, *C. T. White.*

Hypsophila eucalypti, E. M. Wakefield, Kew Bull. 1912, p. 190.

Hab.: On leaves of Eucalyptus sp., Darra, *C. T. White.*

Sphærella nubilosa, Cke.

Hab.: On leaves of Eucalyptus spp., several localities in South Queensland, *C. T. White.*

Asterina microthyroides, Wint.

Hab.: On leaves of *Eucalyptus siderophloia,* var. *rostrata,* Eidsvold, *Dr. T. L. Bancroft.*

Plate 23.—Loranthus Quandang, *Lindl. var.* Bancroftii, *Bail. n. var*

Order ALGÆ.

The following additions to our Marine Algæ (seaweeds) have been determined by Mr. A. D. Cotton, Royal Botanic Gardens, Kew, England :—

FAMILY NEVACEÆ.

Enteromorpha Gunniana, J. Ag.

Hab. : Coolangatta, *C. T. White.*

FAMILY CLADOPHORACEÆ.

Cladophora albida, (Huds.) Kuetz.

Hab. : Coolangatta, *C. T. White.*

FAMILY CHÆTANGIACEÆ.

Brachycladia marginata, Soland. ; **forma dilatata,** (Kuetz) J. Ag.

Hab. : Coolangatta, *C. T. White.*

FAMILY GELIDIACEÆ.

Gelidium pusillum, Le Jol.

Hab. : Coolangatta, *C. T. White.*

FAMILY SPHÆROCOCCACEÆ.

Gracilaria Lucasii, Gepp., in Journ. Bot. 44 (1906) p. 256.

Hab. : Moreton Bay, *C. T. White.*

TIMES OF SUNRISE AND SUNSET AT BRISBANE; 1912.

DATE.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·14	5·16	6·31	5·0	6·40	5·3	6·30	5·18
2	6·14	5·15	6·31	5·0	6·40	5·4	6·30	5·18
3	6·15	5·14	6·32	5·0	6·40	5·4	6·29	5·19
4	6·15	5·13	6·32	5·0	6·40	5·4	6·29	5·20
5	6·16	5·13	6·33	5·0	6·40	5·4	6·28	5·20
6	6·17	5·12	6·33	5·0	6·40	5·5	6·28	5·20
7	6·17	5·12	6·34	5·0	6·40	5·5	6·27	5·21
8	6·18	5·11	6·34	4·59	6·40	5·6	6·26	5·21
9	6·18	5·10	6·35	4·59	6·39	5·6	6·25	5·22
10	6·19	5·10	6·35	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6·23	5·23
12	6·20	5·9	6·35	4·59	6·39	5·7	6·22	5·24
13	6·20	5·8	6·36	4·59	6·39	5·8	6·21	5·25
14	6·21	5·8	6·36	4·59	6·39	5·8	6·20	5·25
15	6·21	5·7	6·36	4·59	6·39	5·9	6·19	5·26
16	6·22	5·7	6·37	4·59	6·38	5·9	6·18	5·26
17	6·22	5·6	6·37	4·59	6·38	5·10	6·17	5·26
18	6·23	5·6	6·38	5·0	6·37	5·11	6·16	5·27
19	6·24	5·5	6·38	5·0	6·37	5·11	6·16	5·27
20	6·24	5·5	6·38	5·0	6·36	5·12	6·15	5·28
21	6·25	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·26	5·4	6·39	5·1	6·36	5·12	6·13	5·28
23	6·26	5·3	6·39	5·1	6·35	5·13	6·12	5·29
24	6·27	5·3	6·39	5·1	6·35	5·13	6·11	5·29
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5·30
26	6·28	5·2	6·39	5·1	6·33	5·15	6·9	5·30
27	6·28	5·1	6·40	5·2	6·33	5·15	6·8	5·30
28	6·29	5·1	6·40	5·2	6·32	5·16	6·7	5·31
29	6·29	5·1	6·40	5·2	6·32	5·16	6·6	5·31
30	6·30	5·0	6·40	5·3	6·31	5·17	6·5	5·32
31	6·30	5·0	...	...	6·31	5·17	6·4	5·32

PHASES OF THE MOON.

			H.	M.	
1 May	○	Full Moon	8	19	p.m.
9 „	☽	Last Quarter	7	56	„
17 „	●	New Moon	8	14	a.m.
24 „	☾	First Quarter	12	11	„
31 „	○	Full Moon	9	30	„
8 June	☽	Last Quarter	12	36	p.m.
15 „	●	New Moon	4	24	„
22 „	☾	First Quarter	6	39	a.m.
29 „	○	Full Moon	11	34	p.m.
8 July	☽	Last Quarter	2	47	a.m.
14 „	●	New Moon	11	13	p.m.
21 „	☾	First Quarter	3	18	„
29 „	○	Full Moon	2	28	„
6 Aug.	☽	Last Quarter	2	18	p.m.
13 „	●	New Moon	5	58	a.m.
20 „	☾	First Quarter	2	57	„
28 „	○	Full Moon	5	59	„

Vegetable Pathology.

A STRAWBERRY DISEASE.

DUE TO THRIPS' INJURY.

By HENRY TRYON, Government Entomologist and Vegetable Pathologist.

A strawberry-plant disease, locally more or less prevalent in certain parts of Southern Queensland, and whose cause and exact nature has until lately been unascertained, having been lately inquired into, the following account of a typical instance of such an occurrence is herein recorded:—

Occurrence.—It was met with in two plots of strawberry plants comprising an area of about ½ acre, and although other varieties manifested its presence, the one named "Glenfield Beauty" seemed to be the most injured, but it is not to be inferred that this is most susceptible to injury until more extended inquiry has been made. Plants affected showed every degree of injury short of complete destruction, being commonly, however, rendered wholly unprolific.

Symptoms.—With regard to general features presented it may be stated that the plants affected, if already well grown, possessed a somewhat "bunched" instead of an open habit of growth—a feature apparently due to the shortening and curvature of the leaf stalks. The leaf blades were again somewhat infolded and contorted, with the upper surfaces more or less infused with a darkish purple colour, variable in intensity, but sometimes very pronounced. The leaf stalks, again, instead of being green were of a dark reddish brown colour. An unusual number of fruits had stopped growing at a very early stage, and were in many cases brown, black, or already dead. More developed ones, instead of being creamy white with pale green "seeds"(drupeoles), were conspicuous for their brownish hue, with the "seeds" themselves brown. Those of larger growth still presented the same features and were also dull instead of bright, with the surface more or less mottled with brown or gray. In both cases, again, they usually rotted without ripening, and showed a growth of some mould fungus upon them. Oftentimes when fruit was formed it presented an irregular, many-lobed form. In addition to these features there might be an unusual number of dead leaves present even about the centre of growth, and the older ones might exhibit patches and blotches of dead tissue to a greater extent than ordinarily is the case. In fact, this degeneration might have proceeded to the extent of producing a small and stunted sickly plant from one of large size and vigorous habit.

Cause.—This pronounced injury was found to be produced by small insects representing the family of the "Thrips" (*Thysanoptera*). More than one kind possibly contributed towards it, but the principal damage

was evidently occasioned by a very small kind, measuring about 6 millimetres in length; although, of other species represented, one that was about 1 mm. (1/24th in.) long was fairly prevalent also. These insects occurred both winged and wingless, according to their age, and were very active, hopping away or flying when disturbed. At the time when the affected area was visited, and that succeeded two days of more or less continuous rain, the insects were principally met with in the flowers, although some occurred on the fruit surfaces.

These examples of thrips effect the damage remarked in the following manner. With their mounth organs, that are of a very peculiar character, they prick in feeding the surfaces on which they occur; and, moreover, with two saw-like organs forming part of their remarkable ovipositor they make minute slits into the living tissue, into which to place their peculiarly formed, relatively large red eggs. Viewing the matter more closely, the following injuries are thus occasioned. As soon as the flowers will admit the insects into their interior, we find them present therein. Here they bite the somewhat thick filament of the stamens, producing in them red specks throughout their lengths, then the anthers themselves. At the same time they attack the pistils and stigmas, causing the premature death and darkening of both. So also they prick the carpels and receptacles on which these are seated. The pistils and carpels soon in many cases become covered with a fungus growth (*Cladosporum* sp., &c.). If growth continues and a fruit is developed (this may be variously distorted as regards form) they continue to injure the carpels and also the surface of the receptacle that intervenes between them. The former become irrorated or clouded with little purple dots, and hence their dark discolouration. The latter —the receptacle (fruit)—also is similarly discoloured in patches; moreover, its skin, not being able to extend as it enlarges, becomes ruptured, widely opened shallow fissures exposing its flesh. The calyx may also exhibit similar discolouration in evidence of its having been injured. Again, the leaf stalk and principal veins of the leaf-blade are densely covered with little deep-red markings also, to which fact their dark colouration that early develops is due. From the surface of the seeds (carpels) a sticky fluid exudes in consequence of the damage received, and this being the site of mould growth their darkened colour becomes more pronounced. Examining the skin (cortex) of the leaf stalks the deep red thrips' eggs are found occurring singly, deeply embedded therein, and, being numerous, they also contribute to the dark colour that it has acquired. Probably the eggs are placed in the tissue of other parts of the plant also. On the surfaces of the affected part we may find the recently hatched thrips, and wingless individuals—larvæ, nymphs, and pupæ—of a greater age; also the winged individuals themselves. Further, the exuviæ or castskins that have been parted with as the different phases of growth have been perfected. The winged individuals are just within the limit of ordinary vision; the wingless ones are either invisibly small or nearly so.

The number of individual insects discernible, never very high on account of their proneness to hop or fly away when disturbed, is always

reduced by rain, and *vice versâ*. In fact, it is during the continuance of dry weather that this pernicious thrips multiplies and becomes so numerous, with corresponding damage as a result.

The female thrips seem to predominate, and although they lay but few eggs apiece, the habits of related species point to a very rapid rate of growth.

Treatment.—As the insect derives its nourishment from the tissues of the plant and from beneath the surface, it cannot be killed by an ordinary poison. Again, no application that will render marketable fruit distasteful is admissible. The very smallness of the insects, their active habits, and their feathered wings (*Thysanoptera*) render it obligatory that whatever be employed be administered in the form of the finest spray. Sulphur (flowers), that will kill many diminutive insects, apparently fails to destroy them. If we could constantly irrigate the plants from above, using water only, such action would greatly reduce their numbers. It would be better, however, to adopt Quaintance's advice to spray the plants from time to time with a decoction of tobacco, to which a little crude molasses had been added; in making it, 1 lb. of stems (waste tobacco) being boiled to two gallons of water, and the infusion reduced by addition of water to make four gallons. Where the proprietary insecticide "Roseleaf Insecticide," sold as containing nicotine in definite amount, is obtainable, this may be conveniently substituted for the home-made article, using 1 pint to every 6 gallons.

It must be borne in mind, however, that these preparations must in each case be applied more than once to secure useful results, also that they are not preventives against attacks, so that if plants that are untreated occur near or amongst those that have been sprayed, and they are thrips infested, they will serve as a source of supply, and so the damage experienced be perpetuated. Where these investigations were commenced the intelligent horticulturist had opportunely mowed off and burnt a patch of plants that were being greatly injured, and evidently with some consequent—although not permanent—benefit.

Conclusion.—There are grounds for concluding that this trouble is more or less widespread in Australia, and occasions noteworthy loss in dry seasons, growers being content with the experience that "it comes and goes." Its nature and origin do not appear, however, to have been previously elucidated.

Three different kinds of thrips have been found associated with the strawberry in Europe, but I cannot recall any thrips injury being treated of in any European memoir dealing with the insect enemies of this plant. And although D. Moulton, the most recent American authority on the *Thysanoptera*, does not mention the strawberry as a host plant for any one of its members, nevertheless, A. L. Quaintance has described a species that injures this plant in Florida in a manner somewhat similar to what happens here. However, the *Thrips tritici* that he has dealt with is larger than the Australian insect, and seems to confine its attention principally to the carpels and petals of the flowers. (*c.f.* 1897, Quaintance (A.L.)—"Some Strawberry Insects," *Bull.* 42, *Florida Agr. Exp. Stat.*, pp. 552-564.

Animal Pathology.

A FEW NOTES ON INDIGESTION IN CATTLE.

BY A. H. CORY, M.R.C.V.S.

IMPACTION OF THE RUMEN (PAUNCH).

This affection is not so frequent in Queensland as it is in countries where it is necessary to hand-feed cattle for five or six months of the year. In this country, unless cattle are being prepared for show purposes, they are practically always on natural food; consequently, they are not so likely to have the action of their digestive organs deranged. Sometimes, however, it occurs when animals are turned on to green foods, such as lucerne; they then eat too much, fermentation is set up, and the contracting power of the muscles of the rumen is lost, and the food fails to pass on to the omasum and abomasum.

SYMPTOMS.

These vary somewhat according to the length of time the rumen has been impacted. The animal is not anxious to feed, although it may eat a little, but, as the disease progresses, it refuses food altogether. Rumination (chewing the cud) is suspended; at times there are symptoms of colic (gripes), switching the tail, striking at the belly with the hind legs, and grunting. There is very little accumulation of gases, but the rumen appears full, and, if the hand is pressed into the left flank, a depression frequently remains; the flank, in fact, may be termed doughy. The history of the case—such as the food the animal has been eating, the quantity, &c.—is sufficient to tell one the nature of the ailment.

These cases must always be looked upon as serious, more particularly if brought about by excessive quantities of dry food. With green food, more gases generally form, and as these are dispersed the organ regains its tone or muscular contractibility, the animal making a speedy recovery; but only a small amount of food should be given the animal for a few days.

TREATMENT.

When Due to Green Food.—The animal should be treated on lines similar to those described for "hoven" or "tympanites"—viz., if gases are present, the use of the trocar and canula, and purgatives to clear out the bowels; 1 lb., or even 1½ lb., of Epsom salts can be given mixed in 2 to 4 quarts of water, but it is advisable to add to the salts some 2 or 3 drachms of carbonate of ammonia and 1 oz. of ground ginger. After giving the drench, thoroughly knead the lower part of the left flank. This assists to break up the impacted material, and allows more of the drench fluid to mix with and soften the food. If this drench does not act as required, one composed of raw linseed oil 1 pint, calomel 1 drachm, and carbonate of ammonia 2 drachms, should be carefully and

slowly given. Drenches containing oil should always be given with the greatest care, for if any oil finds its way into the trachea (windpipe) and into the lungs, a pneumonia (inflammation of the lungs) commonly follows, because oil, in this case, is an irritant and cannot, like water, be absorbed by the air cells of the lungs. Stimulants are required frequently, and spirits, beer, &c., can be given with advantage every 4 or 6 hours, or the following powder, mixed in 1 pint of cold water and given as a drench:—

Carbonate of ammonia, 2 drachms.
Nux vomica, 30 grains.
Gentian, 4 drachms.

When the medicinal treatment fails, it may be necessary to open the rumen and remove about two-thirds of its contents. An incision is

Plate 24.—Tuberculous Udder of a Cow.

made in the left flank (downwards from the spot where the trocar and canula are inserted for the relief of hoven), large enough to admit the hand; no food must be allowed to fall between the stomach wall and inside part of flank, or inflammation of abdominal cavity lining (peritonitis) or death of the animal will follow. After the required amount of food has been removed, the edges of the stomach walls should be disinfected and sutured with catgut, the edges of the walls being turned inwards; the skin is then sutured, and the wound treated twice daily with some antiseptics, such as carbolic acid 1 part, glycerine 4 parts, water 30 parts. If a qualified veterinary surgeon is available, his services should be sought before this operation is performed, as in many cases it is useless.

"THE RELATION OF TUBERCULOSIS TO THE MILK SUPPLY."

By W. C. ELLARD, Science Master, Queensland Agricultural College.

Although 1911 was an epoch-making year, inasmuch that the Royal Commission on Tuberculosis presented their final report, the members of the community most interested, that is to say, dairymen in general, have not yet had an opportunity of learning much from it. It may not be out of place, therefore, to present to readers of this Journal a brief summary of the work done, and conclusions arrived at, in relation to the dreaded "white plague."

Tuberculosis, consumption, or phthisis, has been recognised as a scourge for centuries, and, early in the nineteenth century, an investigator named Klencke succeeded in transmitting the disease by placing tuberculous material in a healthy animal. About the year 1870, three independent scientists, Armanni, Cohnheim, and Salomonsen, repeated Klencke's experiments in a more elaborate manner, but even then could not form an opinion of the cause of the disease. It was left to that great scientist Koch, to announce, in 1882, that he had discovered the causal agency to be a bacillus, and that he could transmit the disease by means of pure cultures of the organism. In 1897 he published a further account of his research work, and this, together with a statement made by him in a lecture delivered at the International Congress on Tuberculosis in 1901, raised one of the greatest controversies ever known in the scientific world. Koch made two main statements which were absolutely hostile to the expert opinions of the day. Firstly, he said that the bacillus causing the disease in man is different to that found in animals; and, secondly, that man could not be infected by means of the bovine bacillus. These statements were so alarming that a Royal Commission was at once formed, with power to make thorough investigation into all phases of the disease.

The bacillus tuberculosis is the primary cause of the disease. It is a rod-shaped organism, with rounded ends, which exhibits such marked characteristics upon staining that it has been called "*the*" acid-fast bacillus. Its effects in man and all susceptible animals are so characteristic that an examination of diseased tissues is sufficient to diagnose the case, even though the bacillus itself be invisible.

Tuberculosis is by far the commonest disease of man, and, though often contracted in infancy, it seldom manifests itself before the fifth year. From the fifth to the eighteenth year seems to be the most susceptible period. The commonest type of the disease is the infection of the lungs, but the joints, bones, glands, abdominal organs, and the peritoneum are also liable to infection.

In addition to man, the disease is found in cattle, pigs, horses, sheep, goats, rabbits, guinea pigs, chimpanzees, monkeys, fowls (and (fish(?)). This is an exceptionally wide zoological range, and dissemination of the disease is a comparatively easy matter. The obvious question at once presents itself: Is the disease found in these animals and human tuberculosis intercommunicable? From the meagre information yet to hand it is impossible to go deeply into the Commissioners' experiments.

Suffice to say that they have pointed out that the bacillus taken from cattle (known as the bovine type) produces a fatal lesion in cattle, pigs, rabbits, guinea pigs, chimpanzees, monkeys, and goats, whereas the human type—*i.e.*, the bacillus found in man—produced a fatal lesion in guinea pigs, chimpanzees, and monkeys; but caused, even when administered in large and progressive doses, only slight and non-progressive lesions in cattle, pigs, and goats. The effects on rabbits were not uniform, some cases being fatal, whilst others were only slightly affected. In artificial culture the bovine type grows less rapidly and less luxuriantly than the human, but is much more virulent in experimental inoculation. These, and other experiments, caused the Commissioners to declare that there are undoubtedly two distinct types of bacilli, one being found common to man and the other to cattle.

Is it possible, then, for man and cattle to be reciprocally infected? This is a most difficult question to answer. It is easy enough to inoculate cattle with the human type and watch results; but it is only in cases of accidental infection that the effects of the bovine bacillus in man can be seen. It almost stands to reason that the part of man's anatomy most exposed to accidental inoculation is the gastro-intestinal tract, and accordingly the Commissioners collected as many cases of disease in these organs as possible. In all, they examined thirty-eight cases where the primary lesions were caused through the ingestion of the bacillus with food. Of these, twenty-nine had lesions in the abdominal alimentary organs, fourteen being due to the bovine bacillus, thirteen to the human, and two showing evidence of the presence of both types. In the remaining nine cases the disease was manifested in the glands of the neck, and six of these were due to the human bacillus and three to the bovine type. When the bacillus is ingested with the food, then, 45 per cent. of the cases are due to the bovine organism. On the other hand, of forty-nine cases of tuberculosis of the lungs examined, forty-seven were due to the human type and two to the bovine bacillus. This holds good in all other parts of the body, the only danger of infection through the bovine bacillus being through the food. This led the Commission to state that from 4 to 6 per cent. of the tuberculosis from which humanity suffers is due to the cow. These figures may appear small at first sight, but when one considers the number of infants and invalids dependent on milk for their food, one can readily see why the Commission headed their report, "Death in the Milkcan!" At the same time, it will be noticed that after maturity is reached the danger of infection is lessened.

The avian type of bacillus does not cause a lesion in man. The bacillus found in fishes resembles the bacillus tuberculosis only in so far as staining is concerned. It is a known fact that milk drawn from a cow with a tuberculous udder almost invariably contains the specific bacilli; but of all cattle infected with the disease, only from 1 to 3 per cent. have the udder affected. All tuberculous cattle are dangerous, however, inasmuch as the milk may become contaminated with bacilli from the droppings and uterine discharges; and whilst these may not be dangerous to the healthy adult, they are decidedly inimical to the adolescent and infant.

Many lessons can be found in the Commissioners' report, but the outstanding feature is that more care should be exercised in controlling milk supplies. All animals found to have the disease should be destroyed immediately. The test for tuberculosis by means of inoculation is inexpensive and practically infallible. The old objections put forward that inoculation caused the disease are absolutely ridiculous, and are not entertained by any enlightened member of the community. Finally, an old theory upset by this report is that goats are not susceptible to tuberculosis. As has been shown, they are liable to contract the bovine type, which is the bacillus of most concern to dairymen. The various methods of combating tuberculosis, and the scientific methods adopted to produce a clean milk supply, unfortunately cannot be dealt with in this article; but enough has been said to cause every right-thinking man to do his utmost to eradicate this fearful plague; and this can only be done by keeping the herd free from the disease.

HOW TO MAKE AN ASPARAGUS BED.

As asparagus is a permanent crop it is worth taking reasonable trouble to thoroughly prepare the bed. The amount of preparation necessary will to a large extent depend upon the natural soil. Long narrow beds are preferable, so that the cutting can be done from each side, without disturbance of the roots. The beds should be kept low because the yearly dressing will tend to build it up. Four-foot beds taking three rows are a handy width, or two rows may be planted in a three-foot bed. If the shape of the ground at one's disposal makes it desirable to have beds side by side, the whole area, including the 18-in. dividing paths should be prepared. This will give extra feeding room for the roots. To prepare the bed, take out the soil the depth of 18 in., keeping the top spit apart; if the subsoil is very poor it is advisable to wheel it away, and replace it by better. The ground should be thoroughly turned over to the depth of quite 3 ft.

Some authorities advocate another foot, but this is going to unnecessary trouble and expense. Having thoroughly broken up the bottom soil, removing any which is best away, any garden refuse, scrapings from the wood heap, bones, old boots, &c., can be dug in. Any long manure available, and a liberal dressing of bone-dust, say 2 lb. to the square yard, should be worked at the same time. Having prepared the bottom and trodden it fairly firm, old decayed manure and the best of the top soil, should be placed on the bed in alternate layers, and forked over. Continue this until the bed is somewhat higher than the surrounding ground. If left for a few weeks it will sink a good deal. During this time the surface should be turned over two or three times so that the soil will be mellow and warm when the roots are placed in it.—"Garden and Field."

General Notes.

FORMALIN AND HOUSE FLIES.

By E. ERNEST GREEN, Government Entomologist.

(From the "Tropical Agriculturist," Ceylon.)

The use of formaldehyde (or formalin), as a deterrent against house flies, has been recommended—from time to time—for some years. The simple exposure of dishes containing dilute formalin was said to drive away every house fly from the premises, and the success of this treatment has been vouched for by various persons. I must confess, however, that my own experiments with dilute formalin have been uniformly disappointing. Whether our Ceylon house fly is a more hardy race, or whether our warmer climate has a weakening effect upon the action of formalin, the fact remains that I have never been able to record the slightest success with this simple treatment.

But if the house fly can be induced to swallow even a weak dose of formalin, it is certainly fatal to that insect. It does not find plain formalin and water sufficiently attractive; but formalin mixed with sugar or milk, in judicious proportion, is readily imbibed by flies—with fatal results. One method is to fill a soup plate with damp sand, place a disc of blotting paper on the sand, spread the paper with sugar, and sprinkle the sugar with dilute formalin—in the proportion of one part to twenty of water. As commercial formalin is of the strength of only 40 per cent., this dilution represents a mixture of about 2 per cent.

The *Journal of Economic Entomology* for October, 1911 (Vol. 4, No. 5) publishes an article on "Formalin for Poisoning House Flies," by R. I. Smith, of the North Carolina Experiment Station. Mr. Smith set himself the task of freeing a college dairy from a plague of flies. Of the condition of affairs before the treatment he remarks:—"In the milk room the flies covered the walls and ceiling, and the straining-cloth at milking time was actually black with flies." He continues:—"My first experiment proved successful. This was the addition of 1 oz. of 40 per cent. formalin to 16 oz. of fresh milk. This mixture was placed in four shallow tin plates and set on the floor of the milk room about 3 o'clock one afternoon. The flies commenced to feed and die within a few minutes, and continued to die rapidly even while the evening's milk was being brought in and strained. These plates of poison were left over night, and the milkers advised me that the flies were feeding greedily the next morning soon after daylight. The dead flies, swept up about 8 a.m., measured about one pint, representing full 5,000 flies.

"This experiment was repeated for three successive days, and about one pint of dead flies were swept up every morning. In addition to the flies actually secured, many dropped dead outside the windows.

"My next experiment was to use a mixture of half milk and half water instead of whole milk. Formalin was added in the same proportion, 1 oz. to 16 oz. of diluted milk. This proved to attract the flies as well as the whole milk.

"Several variations in the proportion of formalin and milk were tested, but my conclusion is that the use of 1 oz. to 16 is most effective. The following method of stating the formula has been used for newspaper articles, in order that every housekeeper can prepare it easily:—1 oz. (two tablespoonfuls) of 40 per cent. formalin; 16 oz. (1 pint) of equal parts milk and water. This mixture should be exposed in shallow plates, and by putting a piece of bread in the middle of each plate, it furnishes more space for the flies to alight and feed, and in that way serves to attract a greater number of them. Whole milk can be used, but the diluted milk seems to be just as successful.

"A very conclusive test of the efficiency of the above formalin mixture was made in a large calf barn where flies were extremely numerous. Six plates of the mixture were placed in the passage way between the stalls. This passage way is about 6 ft. wide and 30 ft. long. The poison mixture was exposed at 12 o'clock noon, and left until 8 o'clock the next morning. The dead flies when swept up measured three quarts, and certainly one-half as many died in the stalls on each side. I estimated that we killed between forty and fifty thousand flies in twenty hours by this experiment.

"At the writer's suggestion many housekeepers have used the formalin as recommended above, and several have reported the killing of flies by the pint and quart. A gentleman in charge of a farm, where a large horse barn is maintained, tells me that he poisoned a gallon of flies the first day he tried the mixture. This statement was vouched for by other witnesses in whom I have perfect confidence.

"A good place to expose the formalin mixture is on the front and back porches, where flies are frequently numerous, and waiting to enter when the doors are opened. I know of several people who have used it successfully in this manner.

"The use of the formalin-milk mixture in dwelling houses has not proved so successful, except in unscreened kitchens of dining-rooms.

"This poison was tested in the large College mess-hall—where over four hundred students can be seated, resulting in practically cleaning up all the flies in two days. Previous to that time the steward had been using tanglefoot fly paper, often having as many as thirty sheets exposed. Fully that number were present when the formalin was used, but in spite of them the flies were numerous."

I have satisfied myself, by actual experiment, that our Ceylon fly is not proof against this mixture. Sweetened condensed milk was employed in place of fresh milk, and proved to be very attractive. Flies that fed upon this mixture died very quickly—certainly within two minutes.

Though so rapidly fatal to house flies, formalin mixed with syrup was eaten by various kinds of ants with impunity. Ants that had partaken freely of poisoned syrup were still alive and apparently in good health after twenty-four hours.

In recommending this treatment, I wish it to be clearly understood that it should only be accessory to measures of strict cleanliness. Flies breed in filth, and where filth is allowed to remain, fresh broods of flies will constantly replace the victims of the poison. The formalin treatment is merely a palliative to destroy existing flies in a building.

OLD CARNATION PLANTS.

"Garden and Field" says that old carnation plants, three or more years old, may be renovated in the following manner:—Dig out the whole plant, injuring the roots as little as possible; manure the spot where it was growing by digging in cow or sheep manure, and then replant 2 in. or so deeper than it was in the first place, spreading out the branches and covering them with soil. Then give a good watering. Each of the branches will then form new roots, and you will practically have as many young plants as the bush has branches. The same end may be gained by simply spreading 2 or 3 in. of fresh soil over the crown of the carnation and keeping it damp by judicious watering, but the first plan suggested is the better, as it enables you to manure the soil beneath the plant.

A MECHANICAL CORN PICKER.

We were shown last July a most ingenious and, as we are informed, a most effective machine which completely obviates the necessity for hand-picking corn in the field. It has been placed on the market by the International Harvester Company, and can be purchased for £75. It is claimed for this machine that it will do the work of six men in picking maize. As was explained to us by the manager of the company, the machine, drawn by four horses, passes along each row of corn, carrying away the whole stalk, which passes up a kind of open shoot. On reaching the top it is met by two rollers, which detach the cobs, the stalk falling through an elongated opening in the bottom of the shoot. The machine is in regular use in the United States of America, where, as is well known, machinery, wherever possible, is made to take the place of hand labour.

ARTIFICIAL RUBBER.

It is stated that Professor Perkit, of Manchester, has discovered a method of producing artificial rubber at a cost of 2s. 6d. per lb. Several scientific men have, during the past few years, made similar discoveries. How is it then that rubber still keeps up to 4s. and 5s. per lb.? It took over twenty years to find out that synthetic indigo could be produced at small cost. There is, therefore, no room for the sceptic to doubt that synthetic rubber may not some day become a commercial product. But, meanwhile, we would not advise a cessation of the extension of rubber plantations.

HANDLING HEAVY PIPE TOBACCOS.

There are several causes why the pipe tobaccos grown in Queensland have not the desirable qualities of the best American, and some of them are chargeable to the manner of handling after the crop is grown. Many farmers seem to think that the period of careful management is over when the harvest time has come, when really it is the time for greatest care and intelligent work. Open sheds are not the best; the tobacco is thus exposed to all sorts of weather, and conditions cannot be controlled; it cures unevenly and irregularly, producing many sorts in the one shed. The tobacco should not be crowded in the shed or on the sticks, as it cannot get ventilation, and cures green, and consequently bad flavour, and if the weather be hot it is liable to scald and become dead and worthless. Tobacco has not finished its cure as soon as dried out; it still retains objectionable matter that must be either modified or eliminated altogether, and this is accomplished by continued hanging.

Heavy tobaccos put into the bulk as soon as dried do not have the aroma that is in those that have been hung for two or three months longer. It may be stripped and put into hands, but should be re-hung to finish the cure; in fact, it is preferred that it should be stripped soon after it has dried.

In stripping, the green or greenish should be put in hands to itself, and they should be small, not more than twelve or fourteen leaves each, and hung where light and air can get to it; if the hands are large, the leaves in the centre will not bleach out, but remain green. It is best to tie all of the tobacco in small hands, as it will continue the cure more uniformly, can be ordered more regularly, and handled more neatly.

Assorting should be carefully done, that the tobacco may have a uniform appearance, care being taken to put nothing with the best grade, or No. 1, that does not belong there; carelessness in this often causes a lower figure to be paid for it, and *sometimes gives trouble with the purchaser, when he has to reassort it.* Every hand should be tied with a leaf of the same colour as the tobacco in that hand, not necessarily a good leaf, but the hand should be, and look, uniform. Please the eye and you please the purchaser, and the grower that establishes a reputation for neat and proper handling of his crop always gets top prices, for all the buyers want his tobacco, as it gives them no trouble.

Before bulking, it should be thoroughly dried out in the heads, and bulked as it comes into condition, and not when it is drying out, for then the stem may be surcharged with moisture that will be taken up by the leaf, and the whole get too soft and funk.

The proper condition for bulking is when it is just pliable and the midrib or stem will snap halfway down the leaf. The proper condition can be determined by taking the tail in the hand and squeezing them together; if they fall apart slowly after removing the pressure, it is right for bulking, but if they stick together it is too soft, and had better be left hanging.

In bulking, the floor should be well off the ground, and so arranged that the dampness arising from the ground cannot penetrate through to the tobacco. The bulks should be large, not less than 8 or 10 feet

wide, and as long as may be convenient; this allows the tobacco to sweat uniformly and continuously, not being disturbed by weather conditions; whereas narrow bulks sweat fitfully, some days lightly, and on other days not at all, owing to the state of the weather. This is important, as tobacco that does not sweat properly does not develop desirable qualities. The bulk should be well covered at sides and on top.

The bulking should be done about the time summer weather is beginning, that the tobacco may not be chilled when it goes in the bulk, and the weather conditions can be depended on for favourable results.

It should remain in bulk four to six weeks before prizing. It must be borne in mind that the sweating of these tobaccos is an entirely different process to the sweating of cigar leaf.

Note.—The above directions for curing will not do for cigar tobacco.

Answers to Correspondents.

FEEDING CALVES.

"Calf Feed," Mullett Creek—

Mr. E. Graham, Dairy Expert, replies to your question as follows:—

Sunlight cocoanut oilcake is probably better than linseed meal or linseed jelly, while pollard is also a good adjunct to skim milk for calf feeding purposes. The method of preparing the oilcake is to break it into fairly small pieces, then place the pieces in a vessel and pour a small quantity of boiling water over them; immediately cover over with a bag and allow the oilcake to steam. It will be noticed that the oilcake disintegrates, and swells considerably after the absorption of the added moisture. About a cupful of the treated oilcake should be added to the ordinary skim milk ration. The quantity of oilcake may be slightly increased as the age of the calf advances.

RHODES GRASS.

In reply to a correspondent *re* Rhodes Grass, Mr. G. B. Brooks, Instructor in Agriculture, says:—

Rhodes grass should be planted after all danger of frost is over, at the rate of 2 lb. of seed per acre.

In scrub land it should be sown in the ashes immediately after burning off. On land that has been cultivated, sow and simply roll it in.

Rhodes is undoubtedy the best introduced grazing grass we have, but stock should be kept off until it has got a good hold, which will, in most cases, take some four to five months.

HAYSTACK AND FOUNDATION.

"Alfalfa," Allora—

The height of the stack would depend, to some extent, upon the amount of moisture contained in the lucerne hay. Given an average sample of hay, the height would, with the dimensions given, be approximately 30 ft. Asphalt would certainly make a good foundation. A damp-proof foundation can also be constructed by using strong saplings set in blocks or short stumps. A thick layer of brushwood, with a good coating of straw on top, is a fairly good protection from damp, providing a channel has been cut around the stack to drain off the surface water.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JULY, 1912.

Article.		JULY. Prices.
Bacon, Pineapple	lb.	6½d. to 9d.
Bran	ton	£6 15s.
Butter	lb.	1s. to 1s. 2d.
Chaff, Mixed	ton	£3 15s. to £5 15s.
Chaff, Oaten (Victorian)	„	£6 to £7
Chaff, Lucerne	„	£5 to £7 10s.
Chaff, Wheaten	„	£5 to £7
Cheese	lb.	5¼d. to 7¼d.
Flour	ton	£10
Hay, Oaten (Victorian)	„	£9
Hay, Lucerne	„	£3 to £4 10s.
Honey	lb.	2d. to 2½d.
Maize	bush.	4s. 11d. to 5s. 1d.
Oats	„	4s. 6d.
Pollard	ton	£6 15s.
Potatoes	„	£10 to £13
Potatoes, Sweet	cwt.	5s. to 6s.
Pumpkins	ton	£2 15s. to £3 5s.
Wheat, Milling	bush.	5s. 1d. to 5s. 4d.
Onions	ton	£14 10s.
Hams	lb.	1s 1½d.
Eggs	doz.	1s. 4d. to 1s. 7d.
Fowls	pair	3s. to 6s.
Geese	„	7s. 6d.
Ducks, English	„	3s. 9d. to 4s. 6d.
Ducks, Muscovy	„	4s. 6d. to 5s. 9d.
Turkeys (Hens)	„	7s. 6d. to 8s. 2d.
Turkeys (Gobblers)	„	13s. to 18s.

SOUTHERN FRUIT MARKETS.

Apples (Choice), per case	4s. 6d. to 9s.
Apples (Cooking), per case	3s. 6d. to 6s.
Bananas (Fiji), G.M., per bunch	8s. to 9s.
Bananas (Fiji), G.M., per case	16s. 6d. to 18s.
Bananas (Queensland), per bunch	1s. 6d. to 6s.
Bananas (Queensland) per case	14s. to 16s.
Cocoanuts, per dozen	2s. 6d. to 4s.
Lemons (local), per gin case	4s. to 5s.
Mandarins (Emperors), per case	4s. to 6s.
Oranges (Navels), per gin case	7s. to 15s.
Other Oranges, per gin case	3s. to 7s.
Papaw Apples, per quarter-case	2s. to 3s.
Passion Fruit, per half-case	3s. to 6s.
Peanuts, per lb.	5½d.
Pears, per bushel case	10s. to 16s.
Pineapples (Queensland), common, per case	6s. to 7s.
Pineapples (Queensland), Ripley's, per case	6s. to 7s.
Pineapples (Queensland), Queen's, per case	6s. 6d. to 7s.
Quinces, per gin case	4s. to 5s. 6d.
Tomatoes, per half-bushel case	3s. 6d. to 4s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JULY. Prices.
Apples (Eating), per case ...	6s 6d. to 9s.
Apples (Cooking), per case	7s. 6d. to 9s. 6d.
Apricots, per case	...
Bananas (Cavendish), per dozen	3d. to 3½d.
Bananas (Sugar), per dozen	2d. to 2½d.
Cape Gooseberries, per case	5s. to 6s. 6d.
Cherries, per quarter-case	...
Citrons, per cwt.	12s.
Custard Apples, per quarter-case	5s. 6d. to 7s. 6d.
Grapes, per lb.	...
Lemons (Italian), per case	...
Lemons, per case	5s. to 6s.
Mandarins, per case	5s. to 8s.
Mangoes, per case	...
Nectarines, per quarter-case	...
Oranges (Navel), per case	6s. 6d. to 9s 6d.
Oranges (Other), per case	3s. 6d. to 5s. 6d.
Papaw Apples, per quarter-case	1s 6d. to 1s. 9d.
Passion Fruit, per quarter-case	4s. to 6s.
Peaches, per quarter-case	...
Peanuts, per lb.	3½d.
Pears, per case	...
Persimmons, per half-case	...
Plums, per quarter-case	...
Pineapples (Ripley), per dozen	1s. 9d. to 3s.
Pineapples (Rough), per dozen	1s 6d. to 3s.
Pineapples (Smooth), per dozen	3s. 6d. to 4s. 6d.
Rockmelons, per dozen	...
Rosellas, per quarter-case	1s. 6d. to 3s.
Strawberries, per tray	1s. 9d. to 3s.
Tomatoes, per quarter-case	1s. to 4s.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, JUNE, 1912.

Animal.	JUNE. Prices.
Bullocks	£7 17s. 6d. to £8 7s. 6d.
Cows	£5 7s. 6d. to £6 10s.
Merino Wethers	19s. 9d.
Crossbred Wethers	23s. 9d.
Merino Ewes	15s. 6d.
Crossbred Ewes	19s.
Lincoln Ewes	20s. 9d.
Lambs	16s. 3d.
Pigs (Baconers)	...
Pigs (Porkers)	...

Farm and Garden Notes for September.

FIELD.—Spring has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly cultivated, uncleaned ground. Therefore, the cultivator and the horse and hand hoe must be kept vigorously at work to check the weed pests and save the growing crops and much future labour. Attend to earthing up any crops which may require it. There may possibly occur drying winds and dry weather; still, good showers may be looked for in October, and much useful work may be done during the present month which will afford a fair prospect of a good return for labour.

Plant out *Agave rigida, var. sisalana* (sisal hemp plant) in rows 9 ft. by 9 ft., 8 ft. by 8 ft., or 6 ft. by 8 ft. apart, according to the richness of the soil. All dry places on the farm, too rocky or poor for ordinary crops, should be planted with this valuable aloe; especially should limestone country be selected for the purpose. If the soil is very poor and the plants very small, it is better to put the latter out into a nursery of good soil, about 1 ft. to 18 in. apart. Next year they will be good-sized plants. Keep down tall weeds in the plantation, and do not allow couch grass to grow round the roots. The sisal will do no good if planted in low, wet land, or on a purely sandy soil. It thrives best where there is plenty of lime, potash, and phosphoric acid, all of which can be cheaply supplied if wanting in the soil. Sow cotton—Sea Island—near the coast, and Upland generally; Caravonica succeeds best in Northern Queensland. Sow maize, sorghum, imphee, Mazzagua, prairie grass, panicum, tobacco, and pumpkins. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, ginger, and canaigre—the latter a bulb yielding a valuable tanning substance. Plant out coffee.

KITCHEN GARDEN.—Now is the time the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing most kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost; dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and stir the soil in the latter case early next day to prevent caking. Mulching with straw or leaves or litter will be of great benefit as the season gets hotter. It is a good thing to apply a little salt to newly dug beds. It is not exactly known what the action of salt is on the soil, but when it is applied as a top-dressing it tends to check rank growth. A little is excellent for cabbages, but too much renders the soil sterile, and causes hard-pan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow cucumbers, melons, marrows, and squashes at once. If they are troubled by the beetle, spray with

Paris green or London purple. In cool districts peas and even some beetroot may be sown. Set out egg-plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory provided the ground is well worked, kept clean, and that water, manure, and where required shade are provided.

Flower Garden.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature, and see that the bulbs do not come in contact with fresh manure. Keep a good lookout for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snapdragon, coleus. Roses will now be in full bloom. Keep them free from aphis, and cut off all spent blooms. This latter work should be done in the case of all flowers. If you wish to save seeds, do not wait for the very last blooms, but allow some of the very best to go to seed. If you have any toads in the garden or bush-house, encourage them to take up their abode there. They are perfectly harmless in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, gaillardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulacca, mesembryanthemum, calendula, &c.

Orchard Notes for September.

THE SOUTHERN COAST DISTRICTS.

The marketing of citrus fruits, in the later districts, of the late winter or early spring crop of pines and bananas, also of strawberries and Cape gooseberries, will continue to occupy the attention of fruit-growers. I can only repeat the advice I have so often given in these Notes respecting the marketing of all kinds of fruit—viz., to grade the fruit evenly, pack honestly, and display it to the best advantage if you want to get good returns.

September is a very important month to the fruit-grower, owing to the fact that it is usually a dry month, and that it is essential in all cases to keep the land in a high state of tilth, so as to retain the moisture that is required by the various trees that are in blossom, thus securing a good set of fruit. Where irrigation is available, it is advisable to give the trees a good watering should the ground be dry, as this will induce a good growth and cause the fruit to set well. If an irrigation is given, it should be a thorough one, not a mere surface watering, and once the

land is saturated the moisture must be retained in the soil by constant and systematic cultivation. If this is done, one good watering will usually be enough to carry the trees through in good condition to the thunderstorms that come later or even to the summer rains, if the soil is of a deep sandy loamy nature.

No weeds must be allowed in the orchard or vineyard at this time of the year, as they are robbing the trees and plants of both the water and plant food that are so essential to them at this period of their growth.

There is not much to be done in the way of fighting scale insects during the month, as they are more effectually dealt with later on; but where young trees are showing signs of distress, owing to the presence of scale insects, they should be treated, the gas method being the most efficacious.

Beetles and other leaf-eating insects often make their appearance during the month. The best remedy is to spray the trees or plants with one or other of the arsenical washes that are recommended by me in this journal. The vineyard will require considerable attention. Not only must it be kept well worked, but any vines that are subject to the attack of black spot must be sprayed from time to time with Bordeaux mixture. Disbudding must be carefully carried out, as this work is equally as important as the winter pruning, as it is the best means of controlling the future shape of the vine. A very common fault with vines grown in the coast districts is that the buds often remain dormant, only the terminal bud and possibly one other starting into growth, thus leaving a long bare space on the main rods, which is undesirable. When this takes place, pinch back those shoots that have started, and which are taking the whole of the sap, and force the sap into the dormant buds, thus starting them into growth. This will result in an even growth of wood all over the vine—not a huge cane in one part and either a stunted growth or dormant buds on the rest.

Every care should be taken during the month to prevent the fruit fly from getting an early start. All infested oranges, loquats, kumquats, or other fruits should be gathered and destroyed, as the keeping in check of the early spring crop of flies, when there are only comparatively few to deal with, will materially lessen the subsequent crops. Land that is to be planted to pines or bananas should be got ready now, though the planting need not be done till October, November, or even later. Prepare the land thoroughly; don't scratch the surface to the depth of a few inches, but plough as deeply as you have good surface soil, and break up the subsoil as deeply as you can possibly get power to do it. You will find that the extra money expended will be a profitable investment, as it will pay every time.

THE TROPICAL COAST DISTRICTS.

September is usually a very dry month, and fruit trees of all kinds suffer in consequence. The spring crop of citrus fruits should be harvested by the end of the month, as, if allowed to hang later, there

is a great risk of loss by fly. The fruit should be well sweated; and, if carefully selected, well-graded, and well packed, it should carry well to, and fetch high prices in, the Southern States, as there are no oranges or mandarins grown in Australia that can excel the flavour of the best of the Bowen, Cardwell, Cairns, Port Douglas, or Cooktown fruit.

As soon as the fruit is gathered, the trees should be pruned and sprayed with the lime and sulphur wash, as this wash is not only a good insecticide, but it will keep down the growth of all lichens, mosses, &c., to which the trees are very subject.

Every care should be taken to keep down the crop of fruit-fly during the month. All infested fruit should be gathered and destroyed, particularly that in or adjacent to banana plantations. Watch the banana gardens carefully, and keep well cultivated. New land should be got ready for planting, and where land is ready planting can take place.

Papaws and granadillas are in good condition now, and, if carefully gathered and well packed in cases only holding one layer of fruit, they should carry well to the Southern markets if sent in the cool chamber.

THE SOUTHERN AND CENTRAL TABLELANDS.

Prune grape vines at Stanthorpe in the early part of the month, leaving the pruning as late as possible, as the object is to keep the vines back in order to escape damage from late spring frosts. All vines subject to the attack of black spot should be treated with the winter dressing when the buds are swelling; this treatment to be followed by spraying with Bordeaux mixture later on.

Where fruit trees have not received their winter spraying, they should be treated at once before they come out into flower or young growth. Where the orchard or vineyard has not been ploughed, do so, taking care to work the land down fine as soon as it is ploughed, so as to keep the moisture in the soil, as the spring is always the trying time for fruit trees.

Look out for fruit-fly in the late oranges and loquats in the Toowoomba district. Keep the orchards and vineyards well cultivated; disbud the vines when sufficiently advanced. Spray for codlin moth.

In the Central tablelands irrigate vines and fruit trees, and follow the irrigation with deep, constant, and systematic cultivation. Keep down all weed growth, and fight the red scale on citrus trees with cyanide. The objective of the fruit-growers throughout Queensland during September and the two following months is, "How best to keep the moisture in the soil that is required by the trees, vines, plants, and vegetables"; and this objective can only be obtained by irrigation where same is available, or by deep, systematic, and constant cultivation where there is no water available for irrigation.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Societies and associations desirous of being registered and placed on the above list must make application to that effect, and forward to the Under Secretary for Agriculture and Stock the following particulars:—

Number of members who have paid their subscriptions for 1911.
Number of meetings held by the Society during 1911.
Date of the last meeting.
Name of the Secretary for 1912.

It is equally necessary that prompt notice be given to the Editor of changes in the Secretaryship of any Society or Association, a matter which is much neglected. Furthermore, information concerning dates on which shows are to be held must be forwarded to the Editor at least six weeks before the Show date. If these suggestions are not complied with, the Society whose Secretary neglects to supply the required information will be liable to be struck off the list of Societies published monthly in the Journal.

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1911.	1912.
Alligator Creek	Alligator Creek Farmers and Fruitgrowers' Progress Association (*via* Rockhampton)	L. Meyer		
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton ...	...	19 Feb.
Aloomba, *viâ* Cairns	Aloomba Farmers' Association ...	Hugh A. Niven ...		
Amberley ...	Amberley Farmers' Progress Association	J. T. Goldsborough		
Atherton ...	Atherton Agricultural, Pastoral, and Industrial Association	H. McKnight ...		
Ayr	Lower Burdekin Farmers' Association	R. W. Edwards ...		
Ayr	Lower Burdekin Pastoral, Agricultural, and Industrial Association	C. G. M. Boyce ...	...	30 and 31 May
Bajool ...	Bajool and Ulam Farmers' Progress Association	J. Rideout... ...		
Beaudesert ...	Logan and Albert Agricultural and Pastoral Society	M. Selwyn Smith	...	7 and 8 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	G. D. Savage ...	8 Sept.	27 Sept.
Beenleigh ...	Logan Farmers' and Industrial Association	Wm. G. Winnett ...		
Belli ...	Belli Creek Farmers' Progress Association	W. E. Neumann ...		
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephenson ...	6 and 7 July	25 and 26 July
Bin Bin, *viâ* Gooroolba	Bin Bin Farmers and Settlers' Association	Milo Burke ...		
Blackall ...	Barcoo Pastoral Society	C. M. Pegler ...	...	21 and 22 May
Blenheim ...	Blenheim and District and Farmers' Progress Association	W. A. Zerner ...		
Boonah ...	Fassifern and Dugandan Agricultural Association	H. R. Beverley ...	23 and 24 May	23 and 24 May
Boowoogum...	Brooyar Farmers' Progress Association	Jas. Cahill ...		
Bowen ...	Bowen Farmers' Association... ...	A. Smith		
Bowen ...	Bowen Pastoral, Agricultural and Mining Association	L. A. Fraser ...	...	— July
Brisbane ...	The Queensland Dairy Herd Book Society	Alfred Gorrie ..		
Brisbane ...	National Agricultural and Industrial Association of Queensland	Charles A. Arvier	7 to 12 Aug.	12 to 17 Aug.
Brisbane ...	Queensland Chamber of Agricultural Societies	C. A. Arvier ...		
Brisbane ...	Horticultural Society of Queensland	F. W. Woodroffe ..		
Buderim Mountain	Buderim Mountain Coffee and Fruitgrowers' Association	J. L. Fielding ...		
Bundaberg ...	Bundaberg Pastoral, Agricultural, and Industrial Society	S. F. Luke ...	7 and 8 Sept.	30 and 31 May
Bundaberg ...	Canegrowers' Union of Australia (Woongarra Branch)	O. H. Klotz ...		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1911.	1912.
Byrnestown...	Byrnestown Farmers and Dairymen's Progress Association	Geo. H. Bomford ...		
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	H. McMahon ...	21 and 22 Sept.	
Cairns ..	Hambledon Cane Farmers' Association	H. Z. Stephensen...		
Cedar Creek	Ravenshoe Farmers and Graziers' Progress Association	W. H. Bain ...		
Cedar Pocket, Gympie	Cedar Pocket Farmers' Association...	W. A. Fraser ...		
Charleville ...	Central Warrego Pastoral and Agricultural Association	W. S. Meadows ...	29 and 30 May	20 and 21 May
Charters Towers	Charters Towers Pastoral, Agricultural, and Mining Association	A. H. Pritchard ...	...	25 and 26 June
Charters Towers	The Towers Horticultural Society ...	Jas. H. Chappel ...	...	21 and 22 Aug.
Chatsworth ...	Chatsworth Combined Farmers' Association	F. W. Johns ...		
Chatsworth ...	Chatsworth Farmers' Progress Association	W. Allen		
Childers ...	Childers Pastoral, Agricultural, and Industrial Society	J. R. Wrench ...	...	26, 27, & 28 June
Childers ..	Doolbi Canegrowers' Association ...	R. S Rankin ..		
Chinchilla ...	Pelican Farmers and Settlers' Association	H. K. Nevell ...		
Chinchilla	Canaga Farmers' Progress Association	G. J. Rochester ...		
Chinchilla ...	Chinchilla Agricultural and Pastoral Association	R. F. Mackie ...	...	24 April
Clermont ...	Peak Downs Horticultural and Agricultural Society	R. Wheatley ...	...	17 and 18 June
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	S. C. Mott		
Coochin ...	Coochin Farmers' Progress Association	W. Watson ..		
Cooktown ...	Cooktown District Pastoral, Agricultural, Mining, and Industrial Association	E. A. S. Olive ...	21 and 22 June	12 and 13 June
Coulsen ...	Coulsen Farmers' Progress Association	Gustav A. Lewald		
Coulstoun, *viâ* Biggenden	Coulstoun Lakes Farmers' Association	H. W. Radel ...		
Crow's Nest	Crow's Nest Agricultural, Horticultural, and Industrial Association	H. A. Barnett ...	11 and 12 July	30 and 31 July
Dalby ...	**Northern Downs Pastoral and Agricultural Association**	W. R. Hunter ...	10 and 11 May	1 and 2 May
Dallarnil ...	Dallarnil Farmers and Dairymen's Association	W. E. Burton ...		
Didcot ...	Didcot Farmers and Settlers' Association	Fred. Jones ...		
Degilbo ...	Emu Creek Farmers and Dairymen's Progress Association	Percy Harrison ...		
Esk	Esk Pastoral, Agricultural, and Industrial Association	J. G. Smith ...	9 and 10 May	(Abandoned)
Evelyn ...	Millstream Farmers and Settlers' Association	H. R. Gardiner ...		
Fairford ...	Fairford Agricultural and Pastoral Association	H. E. Hollins ...		
Fordsdale, *viâ* Grantham	Fordsdale Farmers' Association ...	W. M. Ridley ..		
Forest Hill ...	Forest Hill Agricultural and Progress Association	J. Stoddart ...		
Gatton ...	Lockyer Agricultural and Industrial Society	W. A. McIlwraith	...	24 and 25 July
Gayndah ...	Gayndah Pastoral, Industrial, Agricultural, and Horticultural Association	M. C. Stephenson...	6 and 7 June	11 and 12 June
Gayndah	Mount Debatable Farmers' Progress Association	Robt. Hutchinson		
Gayndah ...	Second Plateau Farmers' Progress Association	C. T. Meredith ...		
Gayndah ...	Binjour Farmers' Progressive Association	F. G. Hunter ...		
Gin Gin ...	Currajong and Gin Gin Agricultural and Pastoral Society	Chas. M. Morris ...	1 June	22 and 23 May
			Plough	ing Match 18 March
Gladstone ...	Port Curtis Agricultural, Pastoral, and Mining Association	J. T. W. Prown ...	23 and 24 May	22 and 23 May

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address	Name of Society.	Name of Secretary.	Show Dates.	
			1911.	1912.
Goombungee	Goombungee Agricultural, Horticultural and Pastoral Association	E. Jackson		
Gooburrum ...	Gooburrum Farmers' and Canegrowers' Association	W. J. Lutin ..	5 and 6 April	17 and 18 April
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	E. T. Drake ..	...	22 and 23 May
Goondoon ...	Goondoon Farmers' Association ...	J. H. Hendy ...		
Gooroolba ...	Gooroolba Farmers and Settlers' Progress Association	H. A. Harrison ...		
Grantham ...	Ma Ma Creek Farmers' Progress Association	A. McKenzie ...		
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	13 and 14 Sept.	18 and 19 Sept.
Helidon ...	Flagstone Branch of the Darling Downs Farmers' Union	D. Ryan		
Herberton ...	Herberton Mining, Pastoral, and Agricultural Association	Richard Barton ...	...	8 and 9 April
Hughenden ...	North Western Queensland Pastoral and Agricultural Association	H. P. Blackall ...	...	4 and 5 Sept.
Ingham ...	Herbert River Pastoral and Agricultural Association	T. R. Mathewson ...	8 and 9 Sept.	20 and 21 Sept.
Inglewood ...	Inglewood Agricultural Society ...	...	...	10 and 11 April
Innisfail ...	Johnstone River Canegrowers and Manufacturers' Association	Ralph Reid ...		
Ipswich ...	Queensland Pastoral and Agricultural Society	G. W. Allen ...	26 and 28 April	24 and 25 April
Juandah ...	Juandah Dairy and Progress Association	R. Bowie		
Kenmore ...	Brookfield, Pullen Vale, and Moggill Farmers' Association	F. B. Howard ...		
Kilcoy ...	Kilcoy Agricultural, Pastoral, and Industrial Society	W. E. Reason ...	...	25 April
Killarney ...	Killarney Agricultural Society ...	J. Shaw	1 and 2 Mar.	21 and 22 Feb.
Kingaroy ...	Agricultural, Pastoral, and Industrial Society	G. S. Venman ...	...	1 and 2 May
Kin Kin, *viâ* Cooran	Kin Kin and District Farmers' Progressive Association	A. C. Stewart ...		
Kooroongarra, *viâ* Inglewood	Kooroongarra Farmers' Progress Association	J. French		
Laidley ...	Hatton Vale Farmers' Progress Association	W. H. Pimlott ..		
Longreach ...	Longreach Pastoral and Agricultural Society	A. Petersen ...	10 and 11 May	6 and 7 May
Lowood ...	Lowood and Tarampa Pastoral and Agricultural Association	E. C. Nunn ...	17 and 18 May	14 and 15 May
Mackay ...	Pioneer River Farmers and Graziers' Association	T. J. Leonard ...	21 and 22 June	18 and 19 June
Macnade, *viâ* Lucinda	Macnade Farmers' Association	E. S. Waller ...		
Mapleton ...	Mapleton Fruitgrowers and Farmers' Progress Association	J. G. Smith ...		
Marburg ...	Marburg and District Agricultural and Industrial Association	A. H. Bielefeld ...	...	10 and 11 July
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	H. A. Jones ...	13, 14, and 15 June	18, 19, and 20 June
Mitchell ...	Maranoa Pastoral, Agricultural, and Industrial Association	Neil Hammond ...	23 and 24 May	14 and 15 May
Mondure, *viâ* Wondai	Mondure Farmers and Dairymen's Association	G. E. Compagnoni		
Montville ...	Montville Fruitgrowers and Farmers' Progress Association	F. W. Thompson ...		
Mooloolah ...	The Mooloolah and Glenview Farmers' Progress Association	Ewen Maddock ...		
Mullet Creek	Mullet Creek Farmers' Association ...	G. Lee		
Muudubberra	Mundubberra Farmers and Settlers' Progress Association	S. Smalldudge ...		
Murray's Creek	Murray and Baffle Creek Progress and Farmers' Association	T. J. Gee ...		
Nambour ...	Maroochy Pastoral, Agricultural, Horticultural, and Industrial Society	A. H. Bushnell ...	12 and 13 July	24 and 25 July

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1911.	1912.
Nanango ...	Nanango Agricultural, Pastoral, and Mining Society	O. Hamilton ...	4 and 5 April	8 and 9 May
Nerang ...	Southern Queensland and Border Agricultural and Pastoral Association	Jas. E. Herbert ...		
North Arm, N. C. Railway	North Arm Farmers' Progress Association	C. H. Ham ...		
North Pine ...	The Pine Rivers Agricultural, Horticultural, and Industrial Association	S. A. French ...	7 and 8 July	26 and 27 July
Oakey ...	Oakey Agricultural and Pastoral Society	Alan B. Stanley ...	13 Sept.	18 Sep
Oakey ...	Kenilworth Farmers' Association ..	Harry Pickering ...		
Okeden, *viâ* Wondai	Proston, Okeden, and Wigtoun Settlers' Association	R. McNamara ..		
Omanama ...	Redbank Farmers' Progress Association	W. K. Ison ...		
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	W. Browne ...		
Palmwoods ...	Palmwoods Central Progress and Horticultural Association	H. W. Major ...		
Pickanjennie	Pickangennie Farmers' Progress Association	J. Proud		
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association	L. G. Sims... ...	25 Jan.	31 Jan.
Pomona ...	Noosa Agricultural, Horticultural, and Industrial Society	J. J. Wilkinson ...	1 and 2 Nov.	20 and 21 Nov.
Proserpine ...	Proserpine Agricultural, Pastoral, and Industrial Association	J. W. Nancarrow...	...	3 Aug.
Roche Creek, *viâ* Miles	Roche Creek Farmers' Progress Association	G. F. Smith ...		
Rockhampton	Alton Downs Farmers' Association...	G. T. Crook ...		
Rockhampton	Rockhampton Agricultural Society ...	H. Hill	...	6, 7, and 8 June
Roma ...	Western Pastoral and Agricultural Association	Angus McPherson	16 and 17 May	7 and 8 May
Rosewood ...	Rosewood Agricultural and Horticultural Association	W. G. S. Blackmore	30 and 31 Aug.	31 July and 1 Aug.
Springsure ...	Springsure Pastoral and Agricultural Society	W. Fisher	...	16 and 17 May
St. George ...	Balonne Pastoral and Agricultural Association	Mark Roberts ...	...	23 and 24 April
Stanthorpe ...	Stanthorpe Agricultural Society ...	A. E. Bateman	...	5 and 6 Feb.
Tabragalba ...	Tabragalba and Canungra Farmers' Progress Association	A R. Ludwig ...		
Teutoberg ...	Teutoberg Farmers' Progress Association	E. H. Ochmichen...		
The Caves, *viâ* Rockhampton	Mount Etna Farmers and Selectors' Progress Association	Geo. Smith ...		
Toowoomba...	Royal Agricultural Society of Queensland	A. H. T. Bebe ...	19, 20, 21, 22 April	23, 24, and 25 April
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association	J. N. Parkes ...	27 and 28 June	9 and 10 July
Wallumbilla	Wallumbilla Farmers' Association ...	H. Hembrow ...		
Warwick ...	Eastern Downs Horticultural and Agricultural Association	F. H. Selke ...	14, 15, & 16 Feb.	13, 14, and 15 F b.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	E. Ziegenfusz ...	...	27 July
Wondai ...	Wondai Agricultural, Pastoral, and Industrial Society	C. B. Armstrong ...	...	29 and 30 May
Woodend ...	Warren-Woodend Farmers' Club ...	W. Lehfeld ...		
Woodford ...	Woodford Agricultural, Pastoral, and Industrial Association	A. Hendy	...	10 May
Woomby ...	North Coast Agricultural and Horticultural Society	Jas. McConachie...	9 June	27 and 28 June
Woombye ...	Woombye Fruitgrowers' and Progress Association	J. Cossar Smith ...		
Woongarra ...	Woongarra Canegrowers and Farmers' Union	H. A. Cattermull...		
Yandina ...	Maroochy River Farmers' Union and Progress Association	W. R. Braydon ...		
Yingerbay ...	Yingerbay Farmers' Association ...	R. Frederick ...		
Zillmere ...	Zillmere Agricultural, Horticultural, and Industrial Society	Thos. Crompton ...	16 Sept.	21 Sept.

Departmental Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

Secretaries of Associations are requested to be good enough to forward to the Editor, as early as possible, the dates of forthcoming Shows, as it is important in the interests of the Associations that these dates should be published.

It is equally necessary that prompt notice be given to the Editor of changes in the Secretaryship of any Society or Association, a matter which is much neglected. Furthermore, information concerning dates on which shows are to be held must be forwarded to the Editor at least six weeks before the Show date. If these suggestions are not complied with, the Society whose Secretary neglects to supply the required information will be liable to be struck off the list of Societies published monthly in the Journal.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture and Stock. Applications must be accompanied by a remittance of Sixpence to cover cost. For the convenience of those who are not within reach of a bookbinder, a Special Cover has been designed, which obviates the necessity for binding. These covers will be supplied at One Shilling each.

In order to avoid disappointment, correspondents who wish for replies to questions in the *Journal* are requested to note that it is imperative that all matter for publication on the first day of any month should reach the Editor by the 15th of the previous month.

Persons desiring to communicate with the Queensland Agricultural College and State Farms are requested to address their correspondence to the Principal of the College, Gatton, and to the Managers of the State Farms. The State Farms are: Hermitage (Warwick), Gindie, Warren (Stanwell), Roma, Kairi (Tolga), Kamerunga (Cairns) State Nursery.

It is notified, for the information of intending Visitors to the Queensland Agricultural College, that the Second Wednesday in each month has been set apart for the reception of Parties of Farmers and others desirous of inspecting the Institution. Supplies of hot water and milk can be obtained at the College, if desired.

The Department has now prepared a booklet on "Flower Gardening for Amateurs," which may be obtained on application to the Under Secretary for Agriculture and Stock. Price, TWO SHILLINGS.

NOTICE OF SHOW DATES.

We wish to draw the attention of Secretaries of Agricultural and Pastoral Societies and Associations to the importance of promptly notifying the Editor of any change in the dates on which shows are to be held.

NOTICE.

All communications in connection with the Journal, inquiries, &c., should be addressed to "The Editor" only. Letters addressed personally are liable to delay in reply.

QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

FOR SALE.

PUREBRED PIGS, all from imported stock, including Berkshire and Middle Yorkshires. £1 1s. each for Sows; £2 2s. each for BOARS.

LARGE BLACK PIGS, £1 1s. each for Sows; £2 2s. each for BOARS.

Poultry of the following breeds:—Brown Leghorns, Silver-grey Dorkings, Old English Spangled Game, Indian Game, Plymouth Rocks, White Wyandottes, Silver-laced Wyandottes, Black Orpingtons, Buff Orpingtons, White Leghorns. Prices, from 10s. each, f.o.b. Gatton.

Eggs of the above breeds are available in the season—1st July to 30th November; and nine out of each setting are guaranteed fertile. Should less than nine prove to be fertile, the infertiles will be replaced if returned carriage paid. This rule will be strictly adhered to. Price, 10s. per setting, for all breeds, f.o.b. Gatton.

Applications for Setting of Eggs, accompanied by Remittance, may be made to the Principal, Queensland Agricultural College.

In cases where eggs are forwarded per parcel post, sixteen will be sent to the setting, and no responsibility will be taken in connection with the replacing of any eggs that fail to hatch.

The following Stud Animals are available for Service at the College Farm:—

AYRSHIRE—

Netherton King George, Imported. Sire: Netherton King Arthur. Dam: Midland Young Greenfield.

Bruce of Glengowrie. Sire: Glen Elgin Philanthropist. Dam: Bud of Glen Elgin.

LINCOLN RED SHORTHORN—

Burton Doll, Imported. Sire: Mr. Profit. Dam: Burton Dolly 2nd.

HOLSTEIN—

United States. Sire: Garfield, Imported. Dam: Nobeltje 3rd, Imported.

Only Pure-bred Cows will be served by Imported Bulls.

Sows may be served also by imported Berkshire, British Large Black, and Yorkshire Pigs, at a charge of 5s. for each service.

Vine and Fig Cuttings will be available about the beginning of July.

Paspalum Roots will be supplied to purchasers at 2s. 6d. per sack, f.o.b. Gatton. Applicants will be supplied on receipt of remittance to the amount of the order.

Small quantities of Roots of the following Grasses will also be available for disposal:—Rhodes Grass, Wonder Grass.

FOR SALE.

The following Young Bull:—

No.	Sire.	Dam.	Date Calved.
	DEXTER KERRY.		
63	Micky	Miss Ere	12 October, 1910

Application to be made to the Acting Principal.

QUEENSLAND AGRICULTURAL COLLEGE.

The College, which is situated within 4 miles of Gatton and 1 mile from the College Railway Siding, comprises 1,692 acres, and the buildings can accommodate 60 Students.

TERMS.

Twenty-seven Pounds per annum, paid half-yearly in advance. Students are also charged One Pound per annum each for medical attendance, the sports fund, and for guarantee fee.

The course of instruction includes PRACTICAL AGRICULTURE in all its branches, DAIRYING, GARDENING, STOCK-BREEDING, and MECHANICAL ARTS. Classes are also held daily for THEORETICAL INSTRUCTION in these branches, as well as in SURVEYING, CHEMISTRY, &c.

The College Calendar, giving full particulars, may be obtained on application to the Principal at the College, or to the Under Secretary for Agriculture and Stock, Brisbane.

BURSARIES.

Four bursaries are given annually. An examination for these is held in December of each year. Bursaries will be awarded upon the following conditions:—Candidates (males) to be from fourteen to eighteen years of age, of sound constitution, and in good health; they must have resided in the State for the two years immediately preceding the time of their examination for such bursary; or their parents must have resided in the State three years immediately preceding such examination. The bursar is entitled—subject to good behaviour and the pleasure of Parliament—to free board and instruction as a resident student for a period of three years. He is required to take up his residence at the College within one month of the publication of the results of the examination; otherwise he forfeits his right to a bursary.

The AGE of CANDIDATES for Admission to the College as Students is Fourteen Years.

An Examination will be held on the 17th December next in Brisbane and elsewhere, according to where the Candidates reside, for FOUR BURSARIES at the Queensland Agricultural College, tenable for three years. Candidates must not be less than 14 or more than 18 years of age on the 1st January, 1913. Nominations close on the 18th November, 1912. Full particulars and conditions on application to

THE UNDER SECRETARY,
Department of Agriculture and Stock, Brisbane.

STATE NURSERY, KAMERUNGA, CAIRNS.

RUBBER, COCOA, KOLA-NUT, CAROB BEAN, KAPOCK, VANILLA, CARDAMON, BREADFRUIT, DIVI-DIVI, GINGER, AND OTHER VALUABLE TROPICAL ECONOMIC PLANTS OR SEEDS FOR SALE, AT NOMINAL RATES, TO SETTLERS AND FARMERS.

The Manager notifies that PLANTS or SEEDS of the above useful and valuable AUXILIARY PRODUCTS may be obtained by application. PLANTS available at any time. SEEDS when in season, BEING MOSTLY OF SHORT VITALITY, should be promptly applied for.

KAPOCK, CARDAMON, and especially rare Plants, or Seedlings difficult to raise, 1s. each, or 10s. per dozen; others, 6d. each, or 5s. per dozen. Seed, 6d. per packet. Plus packing, railage, or postage.

PARA RUBBER PLANTS.—Hardy, healthy young Parà Rubber Plants, 3d. each, or 25s. per 100, f.o.b. Cairns, plus packing and railage.

Remittances should accompany applications.

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PARTICULARS OF ECONOMIC PLANTS AVAILABLE AT THE KAMERUNGA STATE NURSERY

may be obtained on application to the Under Secretary, Department of Agriculture and Stock, or to the Manager, Kamerunga State Nursery.

It is notified for the information of Visitors to the Nursery that refreshments will not be supplied as heretofore, excepting in the case of Farmers coming for instruction or on business, and who previously notify the Manager of their intended visit.

RUBBER SEEDS AND PLANTS.

Variety and Name.	Plants or Seed.	When Available.	Price.
Rambong or Assam (*Ficus elastica*)	Plants only	Any time ...	1s. each, 10s. per doz.
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,, ,, ,, ,, ...	Seed ...	Feb. to April	1s. per oz. (about 1 doz.)
Central American (*Castilloa elastica*) ...	Plants ...	Any time ...	6d. each, 5s. per doz.
,, ,, ,, ,, ...	Seed ...	Nov. to Jan.	1s. per oz. (about 100
Iré or Logos Rubber (*Funtumia elastica*) ...	Plants only	Any time ...	1s. each, 12s. per doz.
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Above prices are for delivery on the Nursery. If applicants wish Plants or Seed sent, packing, postages, railage to port, &c., are extra. Seed and small quantities of Plants may be sent by parcels post at purchaser's risk. Plants, being delicate, do not travel well by post.

Hessian-covered cases, holding one to three dozen, cost 4s. 6d. extra, f.o.b. Cairns, whence they will be shipped "freight on." The demand for Seed being large and the supply limited, Orders received, with remittance, will be booked and completed as soon as Seed is available.

* Owing to the limited supply of plants and seed available at the Nursery, settlers requiring large numbers may, by special arrangement of the Department, import in quantity from Singapore or elsewhere. *See* conditions attached.

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PURCHASE OF STOCK AND PRODUCE FROM THE DEPARTMENT OF AGRICULTURE.

—:o:—

Purchasers of Stock and Produce, Plants, Seed, &c., from the State Farms and Agricultural College are reminded that Sales from these Institutions are made for Cash only. Persons desirous of making purchases should, therefore, first ascertain the cost of whatever articles they desire to obtain, and remit the full purchase-money when sending an order.

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Stock Experiment Station,
Yeerongpilly,
Near Brisbane.

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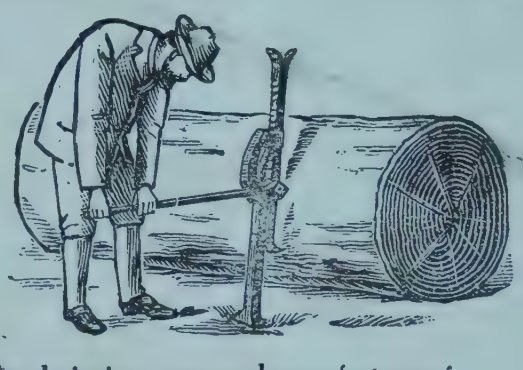

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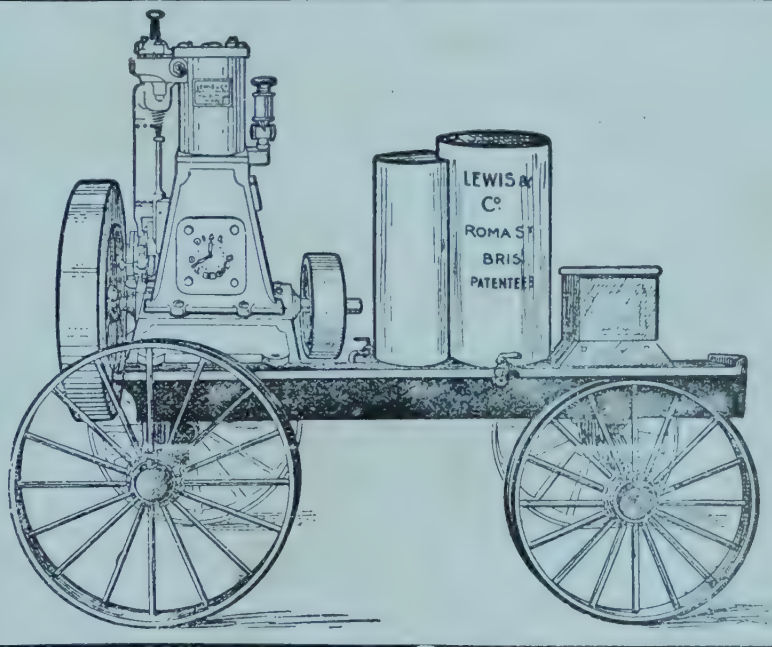

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LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Societies and associations desirous of being registered and placed on the above list must make application to that effect, and forward to the Under Secretary for Agriculture and Stock the following particulars:—

Number of members who have paid their subscriptions for 1911.
Number of meetings held by the Society during 1911.
Date of the last meeting.
Name of the Secretary for 1912.

It is equally necessary that prompt notice be given to the Editor of changes in the Secretaryship of any Society or Association, a matter which is much neglected. Furthermore, information concerning dates on which shows are to be held must be forwarded to the Editor at least six weeks before the Show date. If these suggestions are not complied with, the Society whose Secretary neglects to supply the required information will be liable to be struck off the list of Societies published monthly in the Journal.

Postal Address.	Name of Society.	Name of Secretary	Show Dates.	
			1911.	1912.
Alligator Creek	Alligator Creek Farmers and Fruitgrowers' Progress Association (*via* Rockhampton)	L. Meyer		
Allora	Central Downs Agricultural and Horticultural Association	J. H. Buxton ..	...	21 Feb.
Aloomba, *viâ* Cairns	Aloomba Farmers' Association ...	Hugh A. Niven ...		
Amberley ...	Amberley Farmers' Progress Association	J. T. Goldsborough		
Atherton ...	Atherton Agricultural, Pastoral, and Industrial Association	H. McKnight ...		
Ayr	Lower Burdekin Farmers' Association	R. W. Edwards ...		
Ayr	Lower Burdekin Pastoral, Agricultural, and Industrial Association	C. G. M. Boyce ...	...	30 and 31 May
Bajool ...	Bajool and Ulam Farmers' Progress Association	J. Rideout		
Beaudesert ...	Logan and Albert Agricultural and Pastoral Society	M. Selwyn Smith	...	7 and 8 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	G. D. Savage ...	8 Sept.	27 Sept.
Beenleigh ...	Logan Farmers' and Industrial Association	Wm. G. Winnett ...		
Belli ...	Belli Creek Farmers' Progress Association	W. E. Neumann ...		
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephenson ...	6 and 7 July	25 and 26 July
Bin Bin, *viâ* Gooroolba	Bin Bin Farmers and Settlers' Association	Milo Burke ...		
Blackall ...	Barcoo Pastoral Society	C. M. Pegler ...	...	21 and 22 May
Blenheim ...	Blenheim and District and Farmers' Progress Association	W. A. Zerner ...		
Boonah ...	Fassifern and Dugandan Agricultural Association	H. R. Beverley ...	23 and 24 May	23 and 24 May
Boowoogum...	Brooyar Farmers' Progress Association	Jas. Cahill ...		
Bowen ...	Bowen Farmers' Association... ...	A. Smith		
Bowen ...	Bowen Pastoral, Agricultural and Mining Association	L. A. Fraser ...	...	— July
Brisbane ...	The Queensland Dairy Herd Book Society	Alfred Gorrie ...		
Brisbane ...	National Agricultural and Industrial Association of Queensland	Charles A. Arvier	7 to 12 Aug.	12 to 17 Aug.
Brisbane ...	Queensland Chamber of Agricultural Societies	C. A. Arvier ...		
Brisbane ...	Horticultural Society of Queensland	F. W. Woodroffe ..		
Buderim Mountain	Buderim Mountain Coffee and Fruitgrowers' Association	J. L. Fielding ...		
Bundaberg ...	Bundaberg Pastoral, Agricultural, and Industrial Society	S. F. Luke ...	7 and 8 Sept.	30 and 31 May
Bundaberg ...	Canegrowers' Union of Australia (Woongarra Branch)	O. H. Klotz ...		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of society.	Name of Secretary.	Show Dates.	
			1911.	1912.
Byrnestown...	Byrnestown Farmers and Dairymen's Progress Association	Geo. H. Bomford ...		
Cairns ..	Cairns Agricultural, Pastoral, and Mining Association	H. McMahon ...	21 and 22 Sept.	
Cairns ..	Hambledon Cane Farmers' Association	H. Z. Stephensen...		
Cedar Creek	Ravenshoe Farmers and Graziers' Progress Association	W. H. Bain ...		
Cedar Pocket, Gympie	Cedar Pocket Farmers' Association...	W. A. Fraser ...		
Charleville ...	Central Warrego Pastoral and Agricultural Association	W. S. Meadows ...	29 and 30 May	20 and 21 May
Charters Towers	Charters Towers Pastoral, Agricultural, and Mining Association	A. H. Pritchard ...	...	25 and 26 June
Charters Towers	The Towers Horticultural Society ...	Jas. H. Chappel ...	...	21 and 22 Aug.
Chatsworth ...	Chatsworth Combined Farmers' Association	F. W. Johns ...		
Chatsworth ...	Chatsworth Farmers' Progress Association	W. Allen		
Childers ...	Childers Pastoral, Agricultural, and Industrial Society	J. R. Wrench ..	...	26, 27, & 28 June
Childers ...	Doolbi Canegrowers' Association ...	R S Rankin		
Chinchilla ...	Pelican Farmers and Settlers' Association	H. K. Nevell ...		
Chinchilla	Canaga Farmers' Progress Association	G. J. Rochester ...		
Chinchilla ...	Chinchilla Agricultural and Pastoral Association	R. F. Mackie ...	...	24 April
Clermont ...	Peak Downs Horticultural and Agricultural Society	R. Wheatley ..	...	17 and 18 June
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	S. C. Mott		
Coochin ...	Coochin Farmers' Progress Association	W. Watson ..		
Cooktown ...	Cooktown District Pastoral, Agricultural, Mining, and Industrial Association	E. A. S. Olive ...	21 and 22 June	12 and 13 June
Coulsen ...	Coulsen Farmers' Progress Association	Gustav A. Lewald		
Coulstoun, *viâ* Biggenden	Coulstoun Lakes Farmers' Association	H. W. Radel ...		
Crow's Nest	Crow's Nest Agricultural, Horticultural, and Industrial Association	H. A. Barnett ..	11 and 12 July	30 and 31 July
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. R Hunter ...	10 and 11 May	1 and 2 May
Dallarnil ...	Dallarnil Farmers and Dairymen's Association	W. E. Burton ...		
Didcot ...	Didcot Farmers and Settlers' Association	Fred. Jones ...		
Degilbo ...	Emu Creek Farmers and Dairymen's Progress Association	Percy Harrison ...		
Esk	Esk Pastoral, Agricultural, and Industrial Association	J. G. Smith ...	9 and 10 May	(Abandoned)
Evelyn ...	Millstream Farmers and Settlers' Association	H. R. Gardiner ...		
Fairford ...	Fairford Agricultural and Pastoral Association	H. E. Hollins ...		
Fordsdale, *viâ* Grantham	Fordsdale Farmers' Association ...	W. M. Ridley ..		
Forest Hill ...	Forest Hill Agricultural and Progress Association	J. Stoddart ...		
Gatton ...	Lockyer Agricultural and Industrial Society	W. A. McIlwraith	...	24 and 25 July
Gayndah ...	Gayndah Pastoral, Industrial, Agricultural, and Horticultural Association	M. C. Stephenson...	6 and 7 June	11 and 12 June
Gayndah ...	Mount Debatable Farmers' Progress Association	Robt. Hutchinson		
Gayndah ...	Second Plateau Farmers' Progress Association	C. T. Meredith ...		
Gayndah ...	Binjour Farmers' Progressive Association	F. G. Hunter ...		
Gin Gin ...	Currajong and Gin Gin Agricultural and Pastoral Society	Chas. M. Morris ...	1 June	22 and 23 May
			Plough	ing Match 18 March
Gladstone ...	Port Curtis Agricultural, Pastoral,	J. T. W. Brown ...	23 and 24	22 and 23

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1911.	1912.
Goombungee	Goombungee Agricultural, Horticultural and Pastoral Association	E. Jackson		
Gooburrum ...	Gooburrum Farmers' and Canegrowers' Association	W. J. Lutin ...	5 and 6 April	17 and 18 April
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	E. T. Drake ...	...	22 and 23 May
Goondoon ...	Goondoon Farmers' Association ...	J. H. Hendy ...		
Gooroolba ...	Gooroolba Farmers and Settlers' Progress Association	H. A. Harrison ...		
Grantham ...	Ma Ma Creek Farmers' Progress Association	A. McKenzie ...		
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan .	13 and 14 Sept.	18 and 19 Sept.
Helidon ...	Flagstone Branch of the Darling Downs Farmers' Union	D. Ryan		
Herberton ...	Herberton Mining, Pastoral, and Agricultural Association	Richard Barton ...	...	8 and 9 April
Hughenden ...	North Western Queensland Pastoral and Agricultural Association	H. P. Blackall ...	...	10 and 11 June
Ingham ...	Herbert River Pastoral and Agricultural Association	T. R. Mathewson ...	8 and 9 Sept.	20 and 21 Sept.
Inglewood ...	Inglewood Agricultural Society ...	...	...	10 and 11 April
Innisfail ...	Johnstone River Canegrowers and Manufacturers' Association	Ralph Reid ...		
Ipswich ...	Queensland Pastoral and Agricultural Society	G. W. Allen ...	26 and 28 April	24 and 25 April
Juandah ...	Juandah Dairy and Progress Association	R. Bowie		
Kenmore ...	Brookfield, Pullen Vale, and Moggill Farmers' Association	F. B. Howard		
Kilcoy ...	Kilcoy Agricultural, Pastoral, and Industrial Society	W. E. Reason ...	...	25 April
Killarney ...	Killarney Agricultural Society ...	J. Shaw	1 and 2 Mar.	21 and 22 Feb.
Kingaroy ...	Agricultural, Pastoral, and Industrial Society	G. S. Venman ...	...	1 and 2 May
Kin Kin, *viâ* Cooran	Kin Kin and District Farmers' Progressive Association	A. C. Stewart ...		
Kooroongarra, *viâ* Inglewood	Kooroongarra Farmers' Progress Association	J. French		
Laidley ...	Hatton Vale Farmers' Progress Association	W. H. Pimlott ..		
Longreach ...	Longreach Pastoral and Agricultural Society	A. Petersen ...	10 and 11 May	6 and 7 May
Lowood ...	Lowood and Tarampa Pastoral and Agricultural Association	E. C. Nunn ...	17 and 18 May	14 and 15 May
Mackay ...	Pioneer River Farmers and Graziers' Association	T. J. Leonard ...	21 and 22 June	18 and 19 June
Macnade, *viâ* Lucinda	Macnade Farmers' Association	E. S. Waller ...		
Mapleton ...	Mapleton Fruitgrowers and Farmers' Progress Association	J. G. Smith ...		
Marburg ...	Marburg and District Agricultural and Industrial Association	A. H. Bielefeld ...	...	27 June
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	H. A. Jones ...	13, 14, and 15 June	18, 19, and 20 June
Mitchell ...	Maranoa Pastoral, Agricultural, and Industrial Association	Neil Hammond ...	23 and 24 May	14 and 15 May
Mondure, *viâ* Wondai	Mondure Farmers and Dairymen's Association	G. E. Compagnoni		
Montville ...	Montville Fruitgrowers and Farmers' Progress Association	F. W. Thompson ...		
Mooloolah ...	The Mooloolah and Glenview Farmers' Progress Association	Ewen Maddock ...		
Muudubberra	Mundubberra Farmers and Settlers' Progress Association	S. Smalldudge ...		
Murray's Creek	Murray and Baffle Creek Progress and Farmers' Association	T. J. Gee ...		
Nambour ...	Maroochy Pastoral, Agricultural, Horticultural, and Industrial Society	A. H. Bushnell ...	12 and 13 July	24 and 25 July

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1911.	1912.
Nanango ...	Nanango Agricultural, Pastoral, and Mining Society	O. Hamilton ...	4 and 5 April	8 and 9 May
Nerang ...	Southern Queensland and Border Agricultural and Pastoral Association	Jas. E. Herbert ...		
North Arm, N. C. Railway	North Arm Farmers' Progress Association	C. H. Ham ...		
North Pine ...	The Pine Rivers Agricultural, Horticultural, and Industrial Association	S. A. French ...	7 and 8 July	26 and 27 July
Oakey ...	Oakey Agricultural and Pastoral Society	Alan B. Stanley ...	13 Sept.	18 Sep
Oakey ..	Kenilworth Farmers' Association ...	Harry Pickering ...		
Oman ma ..	Redbank Farmers' Progress Association	W. K. Ison ...		
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	W. Browne ...		
Palmwoods ...	Palmwoods Central Progress and Horticultural Association	H. W. Major ...		
Pickanjennie	Pickangennie Farmers' Progress Association	J. Proud		
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association	L. G. Sims	25 Jan.	31 Jan.
Pomona ...	Noosa Agricultural, Horticultural, and Industrial Society	J. J. Wilkinson ...	1 and 2 Nov.	20 and 21 Nov.
Proserpine ...	Proserpine Agricultural, Pastoral, and Industrial Association	J. W. Nancarrow ...	...	3 Aug.
Roche Creek, *viâ* Miles	Roche Creek Farmers' Progress Association	G. F. Smith ..		
Rockhampton	Alton Downs Farmers' Association ...	G. T. Crook ...		
Rockhampton	Rockhampton Agricultural Society ...	H. Hill	...	6, 7, and 8 June
Roma ...	Western Pastoral and Agricultural Association	Angus McPherson	16 and 17 May	7 and 8 May
Rosewood ..	Rosewood Agricultural and Horticultural Association	W. G. S. Blackmore	30 and 31 Aug.	31 July and 1 Aug.
Springsure ...	Springsure Pastoral and Agricultural Society	W. Fisher	...	16 and 17 May
St. George ...	Balonne Pastoral and Agricultural Association	Mark Roberts ...	...	23 and 24 April
Stanthorpe ...	Border Agricultural, Horticultural, and Pastoral and Mining Society	Alfred E. Bateman	...	7 and 8 Feb.
Tabragalba ...	Tabragalba and Canungra Farmers' Progress Association	A R. Ludwig ...		
Teutoberg ...	Teutoberg Farmers' Progress Association	E. H. Ochmichen ...		
The Caves, *viâ* Rockhampton	Mount Etna Farmers and Selectors' Progress Association	Geo. Smith ...		
Toowoomba ...	Royal Agricultural Society of Queensland	A. H. T. Beebe ...	19, 20, 21, 22 April	23, 24, and 25 April
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association	J. N. Parkes ...	27 and 28 June	9 and 10 July
Wallumbilla	Wallumbilla Farmers' Association ...	H. Hembrow ...		
Warwick ...	Eastern Downs Horticultural and Agricultural Association	F. H. Selke ...	14, 15, & 16 Feb.	13, 14, and 15 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	E. Ziegenfusz ...	...	27 July
Wondai ...	Wondai Agricultural, Pastoral, and Industrial Society	C. B. Armstrong ...	...	29 and 30 May
Woodend ...	Warren-Woodend Farmers' Club ...	W. Lehfeld ...		
Woodford ...	Woodford Agricultural, Pastoral, and Industrial Association	A. Hendy	...	10 May
Woomby ...	North Coast Agricultural and Horticultural Society	Jas. McConachie ..	9 June	27 and 28 June
Woombye ...	Woombye Fruitgrowers' and Progress Association	Jas. McConachie ...		
Woongarra ...	Woongarra Canegrowers and Farmers' Union	H. A. Cattermull ...		
Yandina ...	Maroochy River Farmers' Union and Progress Association	W. R. Braydon ...		
Yingerbay ...	Yingerbay Farmers' Association ...	R. Frederick ...		
Zillmere ...	Zillmere Agricultural, Horticultural, and Industrial Society	Thos. Crompton ...	16 Sept.	21 Sept.

Departmental Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

Secretaries of Associations are requested to be good enough to forward to the Editor, as early as possible, the dates of forthcoming Shows, as it is important in the interests of the Associations that these dates should be published.

It is equally necessary that prompt notice be given to the Editor of changes in the Secretaryship of any Society or Association, a matter which is much neglected. Furthermore, information concerning dates on which shows are to be held must be forwarded to the Editor at least six weeks before the Show date. If these suggestions are not complied with, the Society whose Secretary neglects to supply the required information will be liable to be struck off the list of Societies published monthly in the Journal.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture and Stock. Applications must be accompanied by a remittance of SIXPENCE to cover cost. For the convenience of those who are not within reach of a bookbinder, a Special Cover has been designed, which obviates the necessity for binding. These covers will be supplied at ONE SHILLING each.

In order to avoid disappointment, correspondents who wish for replies to questions in the *Journal* are requested to note that it is imperative that all matter for publication on the first day of any month should reach the Editor by the 15th of the previous month.

Persons desiring to communicate with the Queensland Agricultural College and State Farms are requested to address their correspondence to the Principal of the College, Gatton, and to the Managers of the State Farms. The State Farms are: Westbrook, Biggenden, Hermitage (Warwick), Gindie, Warren (Stanwell), Roma, Kairi (Tolga), Kamerunga (Cairns) State Nursery.

It is notified, for the information of intending Visitors to the Queensland Agricultural College, that the Second Wednesday in each month has been set apart for the reception of Parties of Farmers and others desirous of inspecting the Institution. Supplies of hot water and milk can be obtained at the College, if desired.

The Department has now prepared a booklet on "Flower Gardening for Amateurs," which may be obtained on application to the Under Secretary for Agriculture and Stock. Price, TWO SHILLINGS.

NOTICE OF SHOW DATES.

We wish to draw the attention of Secretaries of Agricultural and Pastoral Societies and Associations to the importance of promptly notifying the Editor of any change in the dates on which shows are to be held.

NOTICE.

All communications in connection with the Journal, inquiries, &c., should be addressed to "The Editor" only. Letters addressed personally are liable to delay in reply.

QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

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PUREBRED PIGS, all from imported stock, including Berkshire and Middle Yorkshires. £1 1s. each for Sows; £2 2s. each for BOARS.

LARGE BLACK PIGS, £1 1s. each for Sows; £2 2s. each for BOARS.

Poultry of the following breeds:—Brown Leghorns, Silver-grey Dorkings, Old English Spangled Game, Indian Game, Plymouth Rocks, White Wyandottes, Silver-laced Wyandottes, Black Orpingtons, Buff Orpingtons, White Leghorns. Prices, from 10s. each, f.o.b. Gatton.

Eggs of the above breeds are available in the season—1st July to 30th November; and nine out of each setting are guaranteed fertile. Should less than nine prove to be fertile, the infertiles will be replaced if returned carriage paid. This rule will be strictly adhered to. Price, 10s. per setting, for all breeds, f.o.b. Gatton.

Applications for Setting of Eggs, accompanied by Remittance, may be made to the Principal, Queensland Agricultural College.

In cases where eggs are forwarded per parcel post, sixteen will be sent to the setting, and no responsibility will be taken in connection with the replacing of any eggs that fail to hatch.

The following Stud Animals are available for Service at the College Farm:—

AYRSHIRE—

Netherton King Georgè, Imported. Sire: Netherton King Arthur. Dam: Midland Young Greenfield.

Bruce of Glengowrie. Sire: Glen Elgin Philanthropist. Dam: Bud of Glen Elgin.

LINCOLN RED SHORTHORN—

Burton Doll, Imported. Sire: Mr. Profit. Dam: Burton Dolly 2nd.

HOLSTEIN—

United States. Sire: Garfield, Imported. Dam: Nobeltje 3rd, Imported.

Only Pure-bred Cows will be served by Imported Bulls.

Sows may be served also by imported Berkshire, British Large Black, and Yorkshire Pigs, at a charge of 5s. for each service.

Vine and Fig Cuttings will be available about the beginning of July.

Paspalum Roots will be supplied to purchasers at 2s. 6d. per sack, f.o.b. Gatton. Applicants will be supplied on receipt of remittance to the amount of the order.

Small quantities of Roots of the following Grasses will also be available for disposal:—Rhodes Grass, Wonder Grass.

FOR SALE.

The following Young Bull —

No.	Sire.	Dam.	Date Calved.
	DEXTER KERRY.		
63	Micky	Miss Ere	12 October, 1910

Application to be made to the Acting Principal.

QUEENSLAND AGRICULTURAL COLLEGE.

The College, which is situated within 4 miles of Gatton and 1 mile from the College Railway Siding, comprises 1,692 acres, and the buildings can accommodate 60 Students.

TERMS.

TWENTY-SEVEN POUNDS per annum, paid half-yearly in advance. Students are also charged One Pound per annum each for medical attendance, the sports fund, and for guarantee fee.

The course of instruction includes PRACTICAL AGRICULTURE in all its branches, DAIRYING, GARDENING, STOCK-BREEDING, and MECHANICAL ARTS. Classes are also held daily for THEORETICAL INSTRUCTION in these branches, as well as in SURVEYING, CHEMISTRY, &c.

The College Calendar, giving full particulars, may be obtained on application to the Principal at the College, or to the Under Secretary for Agriculture and Stock, Brisbane.

BURSARIES.

Four bursaries are given annually. An examination for these is held in December of each year. Bursaries will be awarded upon the following conditions:—Candidates (males) to be from fourteen to eighteen years of age, of sound constitution, and in good health; they must have resided in the State for the two years immediately preceding the time of their examination for such bursary; or their parents must have resided in the State three years immediately preceding such examination. The bursar is entitled—subject to good behaviour and the pleasure of Parliament—to free board and instruction as a resident student for a period of three years. He is required to take up his residence at the College within one month of the publication of the results of the examination; otherwise he forfeits his right to a bursary.

The AGE of CANDIDATES for Admission to the College as Students is Fourteen Years.

An Examination will be held on the 17th December next in Brisbane and elsewhere, according to where the Candidates reside, for FOUR BURSARIES at the Queensland Agricultural College, tenable for three years. Candidates must not be less than 14 or more than 18 years of age on the 1st January, 1913. Nominations close on the 18th November, 1912. Full particulars and conditions on application to

THE UNDER SECRETARY,
Department of Agriculture and Stock, Brisbane.

STATE NURSERY, KAMERUNGA, CAIRNS.

RUBBER, COCOA, KOLA-NUT, CAROB BEAN, KAPOCK, VANILLA, CARDAMON, BREADFRUIT, DIVI-DIVI, GINGER, AND OTHER VALUABLE TROPICAL ECONOMIC PLANTS OR SEEDS FOR SALE, AT NOMINAL RATES, TO SETTLERS AND FARMERS.

The Manager notifies that PLANTS or SEEDS of the above useful and valuable AUXILIARY PRODUCTS may be obtained by application. PLANTS available at any time. SEEDS when in season, BEING MOSTLY OF SHORT VITALITY, should be promptly applied for.

KAPOCK, CARDAMON, and especially rare Plants, or Seedlings difficult to raise, 1s. each, or 10s. per dozen; others, 6d. each, or 5s. per dozen. Seed, 6d. per packet. Plus packing, railage, or postage.

PARA RUBBER PLANTS.—Hardy, healthy young Parà Rubber Plants, 3d. each, or 25s. per 100, f.o.b. Cairns, plus packing and railage.

Remittances should accompany applications.

Lists of Tropical Economical Plants available may be obtained on application to the Manager, Kamerunga State Nursery, Cairns, North Queensland.

It is notified for the information of Visitors to the Nursery that refreshments will not be supplied as heretofore, excepting in the case of Farmers coming for instruction or on business, and who previously notify the Manager of their intended visit.

RUBBER SEEDS AND PLANTS.

Variety and Name.	Plants or Seed.	When Available.	Price.
Rambong or Assam (*Ficus elastica*)	Plants only	Any time ...	1s. each, 10s. per doz.
Para Rubber (*Hevea braziliensis*) *	Plants ...	,, ,, ...	3d. each
,, ,, ,, ,, *	Seed ...	Feb. to April	1s. per oz. (about 1 doz.)
Central American (*Castilloa elastica*) ...	Plants ...	Any time ...	6d. each, 5s. per doz.
,, ,, ,, ,, ...	Seed ...	Nov. to Jan.	1s. per oz. (about 100
Iré or Logos Rubber (*Funtumia elastica*) ...	Plants only	Any time ...	1s. each, 12s. per doz.
Ceara Rubber (*Manihot Glaziovii*) ...	Seed only	,, ,, ...	1s. per oz. (about 50)
West African Rubber (*Tabernæmontana*) ...	Plants ...	, ,, ...	6d. each, 5s. per doz.
,, ,, ,, (*Crassa*)	Seed ...	,, ,, ...	1s. per oz. (about 150)

Above prices are for delivery on the Nursery. If applicants wish Plants or Seed sent, packing, postages, railage to port, &c., are extra. Seed and small quantities of Plants may be sent by parcels post at purchaser's risk. Plants, being delicate, do not travel well by post.

Hessian-covered cases, holding one to three dozen, cost 4s. 6d. extra, f.o.b. Cairns, whence they will be shipped "freight on." The demand for Seed being large and the supply limited, Orders received, with remittance, will be booked and completed as soon as Seed is available.

* Owing to the limited supply of plants and seed available at the Nursery, settlers requiring large numbers may, by special arrangement of the Department, import in quantity from Singapore or elsewhere. *See* conditions attached.

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Purchasers of Stock and Produce, Plants, Seed, &c., from the State Farms and Agricultural College are reminded that Sales from these Institutions are made for Cash only. Persons desirous of making purchases should, therefore, first ascertain the cost of whatever articles they desire to obtain, and remit the full purchase-money when sending an order.

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DOUBLE VACCINE (powder form) for the PREVENTION of BLACKLEG is now prepared by the Department of Agriculture and Stock, and may be obtained in Tubes containing not less than Ten Doses, at a cost of 3s. per Ten Double Doses.

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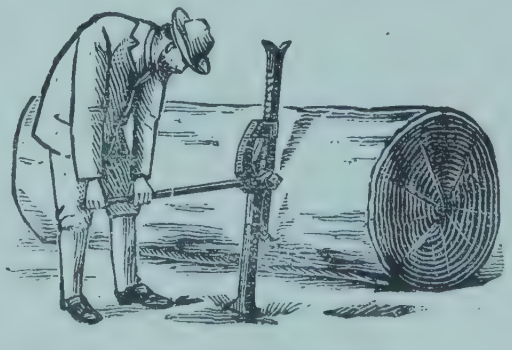

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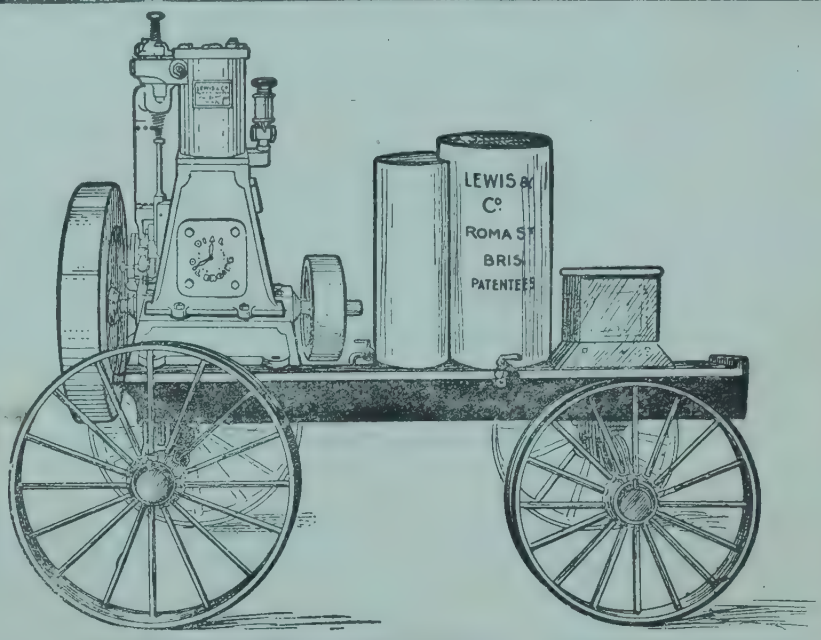

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